



PROJECT ID:

PV467BRAC-R

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/buildnyc

LAW

VOLUME 1 OF 3

BID BOOKLET

FOR FURNISHING ALL LABOR AND MATERIALS
NECESSARY AND REQUIRED FOR:

Bronx River Art Center Renovation

LOCATION:
BOROUGH:
CITY OF NEW YORK

1087 East Tremont Avenue
Bronx 10460

CONTRACT NO. 1

GENERAL CONSTRUCTION WORK

Department of Cultural Affairs

Sage and Coombe Architects



Date:

February 8, 2013

3-023

3-023





NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

DAVID J. BURNEY, FAIA
Commissioner

December 20, 2013

CERTIFIED MAIL - RETURN RECEIPT REQUEST

S & N BUILDERS, INC.
156 East 3rd street
Mount Vernon, NY 10550

RE: FMS ID: PV467BRAC-R
E-PIN: 85013B0075001
DDC PIN: 8502013PV0012C
BRONX RIVER ART CENTER
RENOVATION - BOROUGH OF THE
BRONX
NOTICE OF AWARD

Dear Contractor:

You are hereby awarded the above referenced contract based upon your bid in the amount of \$8,113,500.00 submitted at the bid opening on June 20, 2013. Within ten (10) days of your receipt of this notice of award, you are required to take the actions set forth in Paragraphs (1) through (3) below. For your convenience, attached please find a copy of Schedule A of the General Conditions to the Contract, which sets forth the types and amounts of insurance coverage required for this contract.

- (1) Execute four copies of the Agreement in the Contracts Unit, 30-30 Thomson Avenue, 1st Floor, Long Island City, New York (IDCNY Building). A Commissioner of Deeds will be available to witness and notarize your signature. The Agreement must be signed by an officer of the corporation or a partner of the firm.
- (2) Submit to the Contracts Unit four properly executed performance and payment bonds. If required for this contract, copies of performance and payment bonds are attached.
- (3) Submit to the Contracts Unit the following insurance documentation: (a) original certificate of insurance for general liability in the amount required by Schedule A, and (b) original certificates of insurance or other proof of coverage for workers' compensation and disability benefits, as required by New York State Law. The insurance documentation specified in this paragraph is required for registration of the contract with the Comptroller's Office.



On or before the contract commencement date, you are required to submit all other certificates of insurance and/or policies in the types and amounts required by Schedule A. Such certificates of Insurance and/or policies must be submitted to the Agency Chief Contracting Office, Attention: Risk Manager, Fourth Floor at the above indicated department address.

Your attention is directed to the section of the Information for Bidders entitled "Failure to Execute Contract". As indicated in this section, in the event you fail to execute the contract and furnish the required bonds within the (10) days of your receipt of this notice of award, your bid security will be retained by the City and you will be liable for the difference between your bid price and the price for which the contract is subsequently awarded, less the amount of the bid security retained.

Sincerely,

Lorraine Holley
DACCO

#2

BID FORM
THE CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF STRUCTURES

BID FOR FURNISHING ALL LABOR AND
MATERIAL NECESSARY AND REQUIRED FOR:

PROJECT ID: PV467BRAC-R

Bronx River Art Center Renovation
1087 East Tremont Avenue
Bronx 10460

Name of Bidder: S & N Builders Inc.

Date of Bid Opening: 6/20/2013 @ 2PM

Bidder is: (Check one, whichever applies) Individual () Partnership () Corporation (☒)

Place of Business of Bidder: 156 East 3rd Street, Mt. Vernon, NY 10556

Bidder's Telephone Number: (914) 664-8444 Bidder's Fax Number: (914) 664-8445

Bidder's Email Address: raja@sbuilders.com

Residence of Bidder (If Individual): _____

If Bidder is a Partnership, fill in the following blanks:

Names of Partners

Residence of Partners

_____	_____
_____	_____
_____	_____

If Bidder is a Corporation, fill in the following blanks:

Organized under the laws of the State of New York

Name and Home Address of President: Sakander Raja
12 Rockaway Ave., Garden City, NY 11530

Name and Home Address of Secretary: Noreen Raja
12 Rockaway Ave., Garden City, NY 11530

Name and Home Address of Treasurer: Sakander Raja
12 Rockaway Ave., Garden City, NY 11530



BID FORM - BID ALTERNATE 2

PROJECT ID: PV467BRAC-R

TOTAL BID PRICE: In the space provided below, the Bidder shall indicate the total bid price in figures.

- A. **LUMP SUM PRICE** - Total price for all labor and material for all required work, excluding items (B) and (C) set forth below. Total Price shall include all costs and expenses, i.e. labor, material overhead and profit for all the Work, described and shown in the drawings and specifications.

Total Price For
Labor

Total Price for Material
Sold and Delivered

\$ 4,717,200 + \$ 3,144,800 - Total Price for Item A \$ 7,862,000

- B. **ALLOWANCE** for Incidental Asbestos Abatement
(Section 028013 of the Specifications)

\$15,000.00

- C. **ALLOWANCE** for Unit Prices - page 13-0

21,500

TOTAL BID PRICE (Add A + B + C)
(a/k/a BID PROPOSAL)

\$7,898,500

6/20/13
P. 8

BIDDER'S SIGNATURE AND AFFIDAVIT

WARNING!! Failure to comply with items below will result in the rejection of your bid.

- * **SUBCONTRACTORS:** You **MUST** complete and submit the form entitled "Bidder's Identification of Subcontractors" (See Page 17) at the time you submit your bid. You must submit this form in a separate, sealed envelope (BID ENVELOPE #2). In the event an award of contract is not made to the Bidder, the Bidder hereby authorizes the Agency to shred the form entitled "Bidder's Identification of Subcontractors". ☒ Yes
_____ No

- * **MWBE GOALS:** You **MUST** complete and submit the Affirmations contained in the Subcontractor Utilization Plan (See Page 7), or a pre-approved waiver (See Page 9), at the time you submit your bid. You must submit the Affirmations (or a pre-approved waiver) in BID ENVELOPE #1.

Bidder: S & H BUILDERS

By: [Signature]
(Signature of Partner or corporate officer)

Attest: [Signature]
(Corporate Seal) Secretary of Corporate Bidder

Affidavit on the following page should be subscribed
and sworn to before a Notary Public

BIDDER'S IDENTIFICATION OF SUBCONTRACTORS

BID ALTERNATE 2

Project ID: PV467BRAC-R

SUBMISSION: In addition to its Bid (Bid Envelope # 1), the Bidder must, at the time of the bid, complete and submit this form in a separate, sealed envelope (Bid Envelope # 2). To complete this form, the Bidder must identify the subcontractors it intends to use for the work listed below, as well as the dollar amount to be paid to each subcontractor. Failure to complete this form and submit it in a separate, sealed envelope will result in the disqualification of the bid as non-responsive.

The Bidder intends to use the following subcontractors. If the Bidder intends to do any of the work referenced below with its own forces, the Bidder should complete this form using its own name. If multiple subcontractors for any trade are proposed, Bidder may submit multiple copies of this form.

1. **PLUMBING CONTRACTOR:**

EASTERN PLUMBING
(Print Name)

Agreed Amount To Be Paid To Subcontractor: \$ 25,000.00

2. **HVAC CONTRACTOR:**

MIDTOWN HVAC ENTERPRISES
(Print Name)

Agreed Amount To Be Paid To Subcontractor: \$ 554,000.00

3. **ELECTRICAL CONTRACTOR:**

RYAN ELECTRIC
(Print Name)

Agreed Amount To Be Paid To Subcontractor: \$ 104,000.00

BIDDER'S SIGNATURE: The Bidder must sign this form in the space provided below:

Name of Bidder: SAN BOLDERS

By:

[Signature]
Signature of Partner or Corporate Officer

Print Name:

Sakunda Risa

Title:

President



BID FORM (TO BE NOTARIZED)

AFFIDAVIT WHERE BIDDERS IS AN INDIVIDUAL

STATE OF NEW YORK, COUNTY OF _____ ss:
_____ being duly sworn says:
I am the person described in and who executed the foregoing bid, and the several matters therein stated are in all respects true.

(Signature of the person who signed the Bid)

Subscribed and sworn to before me this
_____ day of _____,

Notary Public

AFFIDAVIT WHERE BIDDERS IS A PARTNERSHIP

STATE OF NEW YORK, COUNTY OF _____ ss:
_____ being duly sworn says:
I am a member of _____ the firm described in and which executed the foregoing bid.
subscribed the name of the firm thereto on behalf of the firm, and the several matters therein stated are in all respects true.

(Signature of Partner who signed the Bid)

Subscribed and sworn to before me this
_____ day of _____,

Notary Public

AFFIDAVIT WHERE BIDDERS IS A CORPORATION

STATE OF NEW YORK, COUNTY OF Westchester ss:
Sakander Raja being duly sworn says:
I am the President of the above named corporation whose name is subscribed to and which executed
the foregoing bid. I reside at 12 Rockaway Ave., Garden City, NY 11530.
I have knowledge of the several matters therein stated, and they are in all respects true.

(Signature of Corporate Officer who signed the Bid)

Subscribed and sworn to before me this
22 day of May, 2013

Notary Public

ADNAN RAJA
NOTARY PUBLIC, State of New York
No. 01RA6134415
Qualified in Nassau County
Commission Expires October 03, 2013

AFFIRMATION

The undersigned bidder affirms and declares that said bidder is not in arrears to the City of New York upon debt, contract or taxes and is not a defaulter, as surety or otherwise, upon obligation to the City of New York, and has not been declared not responsible, or disqualified, by any agency of the City of New York, nor is there any proceeding pending relating to the responsibility or qualification of the bidder to receive public contracts except None

(If none, the bidder shall insert the word "None" in the space provided above.)

Full Name of Bidder: S & N Builders, Inc
Address: 156 East 3rd Street
City: Mt. Vernon State: NY Zip Code: 10550

CHECK ONE BOX AND INCLUDE APPROPRIATE NUMBER:

☐ A - Individual or Sole Proprietorship *
SOCIAL SECURITY NUMBER

☐ B - Partnership, Joint Venture or other unincorporated organization
EMPLOYER IDENTIFICATION NUMBER

☒ C - Corporation
EMPLOYER IDENTIFICATION NUMBER

11 3512788

By: _____

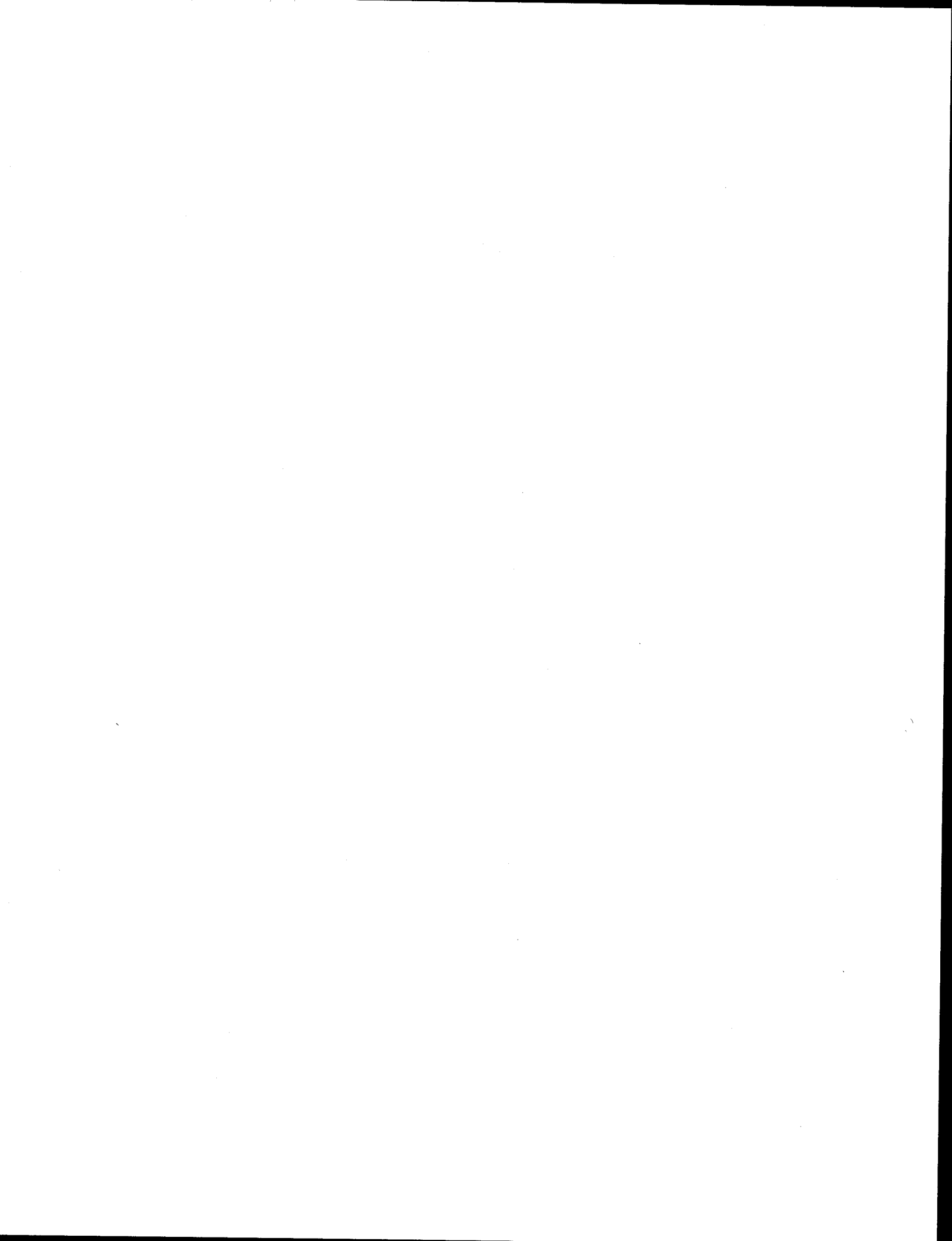
Signature: _____

Title: President

If a corporation, place seal here

This affirmation must be signed by an officer or duly authorized representative.

* Under the Federal Privacy Act the furnishing of Social Security Numbers by bidders on City contracts is voluntary. Failure to provide a Social Security Number will not result in a bidder's disqualification. Social Security Numbers will be used to identify bidders, proposers or vendors to ensure their compliance with laws, to assist the City in enforcement of laws, as well as to provide the City a means of identifying of businesses which seek City contracts.



Unit Price Schedule

Unit Price items: The items of work set forth in the Schedule below shall be performed by the contractor on a unit price basis for additional work. Such items of work shall be performed by the contractor only as directed in writing by the Commissioner.

The unit price for the items of work in the Schedule below are for EXTRA WORK ONLY i.e., work which is above and beyond that described in the Drawings and Specifications.

The bidder shall submit prices for all the items of work in the Schedule below. The bidder shall insert the total sum for all unit price items on the Bid Form, Item C - Allowance for Unit Prices. The unit price bid for each item shall include all costs and expense for the item, i.e., labor, material, overhead and profit. Quantities shown are approximate and for bid comparison purposes only. Actual amounts to be determined when the work is performed.

CSI #	Item #	Item Description	Quant.	Units	Unit Price	Total
061000	1	Replace Damaged Floor Joist	100	LF	30	3,000
061000	2	Add Floor Joists for Floor Levelling	500	LF	30	15,000
061600	3	Remove & Patch Damaged Roof Decking	100	SF	35	3,500

Total Amount of Unit Price Work

* Insert Total amount of Unit Price Work on line C of Bid Form

(Bid Form - Bid Alternate 1, Bid Form - Bid Alternate 2, Bid Form - Bid Alternate 3)

21,500 *

Note: All quantities are approximate

Qualification Form

Project ID: PV467BRAC-R

List previous projects completed to meet the special experience requirements for this contract. Please photocopy this form for submission of all required projects.

Name of Contractor: S & N Builders, Inc.

Name of Project: Bedford District Health Center

Location of Project: 485 Throop Ave., Brooklyn, NY

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

Name: Blaine Belgrave

Title: Project Manager Phone Number: 718-391-1377

Brief description of work completed: Facade upgrade installation of drywells
reconstruction of sidewalks and repaving of parking lot

Was the work performed as a prime or a subcontractor: Prime

Amount of Contract: \$3,047,695.00

Date of Completion: 9/25/2006 to 5/15/2009

Name of Contractor: S & N Builders, Inc

Name of Project: Installation of Sidewalks at Various Locations in Manhattan

Location of Project: Various Locations in Manhattan

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

Name: Pierre Jr. Rameau

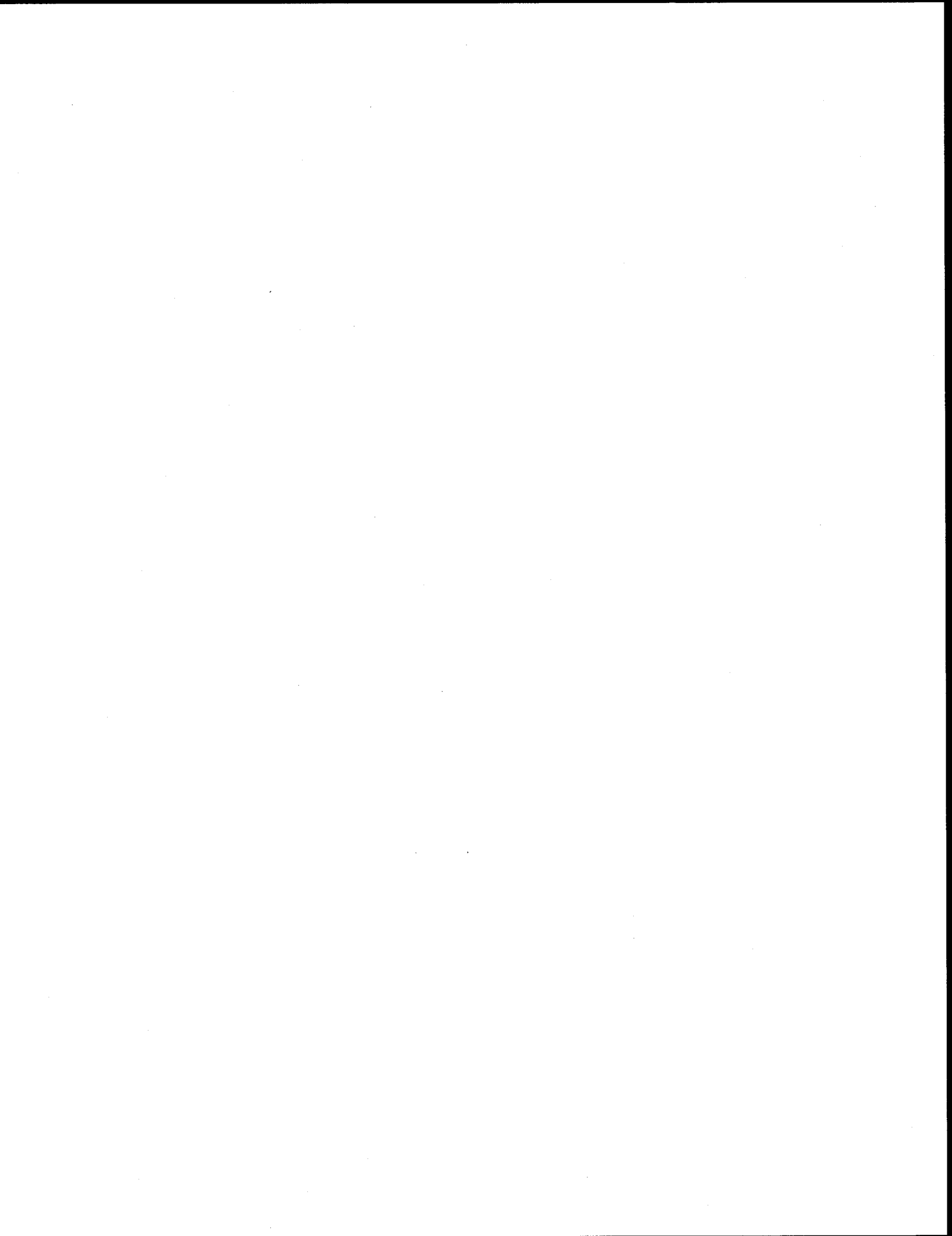
Title: Project Manager Phone Number: 212-442-7933

Brief description of work completed: Installation of Side walks adjacent Curbs
and pedestrian ramps as necessary.

Was the work performed as a prime or a subcontractor: Prime

Amount of Contract: \$2,271,535.38

Date of Completion: 9/1/2011 to 11/15/2012



A. PROJECT REFERENCES – SIMILAR CONTRACTS COMPLETED BY THE BIDDER

List all contracts substantially completed within the last 4 years similar to the contract being awarded, 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
Installation of sidewalks, adjacent curbs and pedestrian ramps as necessary at various locations in Manhattan	GC	\$2,271,535.38	9/24/2012	DDC Pierre Jr. Rameau 212.442.7983	KSE Engineers (CM) Al Z. Farag (Project Engineer) 646.296.8523
Bedford District Health Center Exterior rehabilitation and roof upgrade 485 Throop Avenue, Brooklyn, NY	GC	\$3,047,695.00	5/15/2009	DDC Blain Belgrave 718.391.1377	Swanke Hayden Connell Architects 212.219.6664
Parkchester Regional Library ? ? Bronx, NY	GC	\$2,671,281.00	10/17/2007	DDC Michael Minuto 718.391.1358	
Sand Castle at Beach Exterior and roof rehabilitation 60 Beach Street, New York, NY	GC	\$1,734,088.00	12/31/2008	Sand Castle at beach, LP John Simonlaci 917.545.6100	c/o Sand Castle at Beach, LP John Simonlaci 917.545.6100
67th Street Branch Library ? ? New York, NY	GC	\$1,903,151.00	11/21/2007	DDC Michael Minuto 718.391.1358	
St. Albans Veterans Home Renovations and Additions ? Jamaica, NY	GC	\$4,233,343.00	11/30/2009	NYS OGS Henry Gambaro 917.731.5246	Werfel & Associates 718.263.6575
Valentine Realty Holdings LLC. New construction of 7 story building 2881 Valentine Ave, Bronx, NY 10458	GC	\$2,500,000.00	11/25/2008	Valentine Realty LLC. John Carretta 347.245.2506	Stephen Lepp Associates 212.925.4800



B. PROJECT REFERENCES – 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
Kew Gardens Hills Library Renovation and expansion 72-33 Vleigh Pl, Flushing, NY	GC	\$5,601,192.00	\$2,000,000.00	\$4,921,331.55	12/29/2013	DDC Michael Minuto 718.391.1358	Work AC Dan Wood 212.228.1333

NEW YORK CITY DEPARTMENT OF DESIGN AND CONSTRUCTION

PROJECT: Bronx River Art Center Renovation
 LOCATION: 1087 East Tremont Avenue, Bronx, NY 10460
 BIDDER: S & N BUILDERS, Inc.
 155 East 3rd Street, Mt. Vernon, NY 10550

CONTRACTOR'S BID BREAKDOWN FORM
 CONTRACT 1 - General Construction

DDC ID: PV467BPHL
 Sponsor Agency: Department of Cultural Affairs

ESTIMATING C.D.V. UNIT
 2013 AUG 15 A 9:38

CSI Number	Description	Quantity	Unit	Unit cost of Material	Total Cost of Material	Unit Cost of Labor	Total Cost of Labor	Total Cost of Material and Labor
Contract 1 - GENERAL CONSTRUCTION BID ALTERNATE 1								
010000	GENERAL REQUIREMENTS							
	MOBILIZATION	1.00	LS	\$ 110,446.15	\$ 110,446.15	\$ 165,669.23	\$ 165,669.23	\$ 276,115.38
	TEMPORARY HEAT	1.00	LS	\$ 5,000.00	\$ 5,000.00	\$ 10,000.00	\$ 10,000.00	\$ 15,000.00
	FIRE GUARDS	1.00	LS	\$ 5,000.00	\$ 5,000.00	\$ 10,000.00	\$ 10,000.00	\$ 15,000.00
	SECURITY GUARDS	1.00	LS	\$ 50,000.00	\$ 50,000.00	\$ 75,000.00	\$ 75,000.00	\$ 125,000.00
	SUBTOTAL				\$ 170,446.15	\$ 260,669.23	\$ 260,669.23	\$ 431,115.38
017419	CONSTRUCTION WITH WASTE MANAGEMENT & DISPOSAL							
	COMMISSIONING	1.00	LS	\$ 1,000.00	\$ 1,000.00	\$ 2,000.00	\$ 2,000.00	\$ 3,000.00
018100	DEMONSTRATION AND TRAINING							
018113	SUSTAINABLE DESIGN REQUIREMENTS (LEED BUILDING)							
	LEED ADMINISTRATION & COMPLIANCE	1.00	LS	\$ 10,000.00	\$ 10,000.00	\$ 20,000.00	\$ 20,000.00	\$ 30,000.00
018113.3	VOLATILE ORGANIC COMPOUND (VOC) LIMITS FOR ADHESIVES, SEALANTS, PAINTS & COATINGS							
018119	CONSTRUCTION IAQ REQUIREMENTS							
	IAQ REQUIREMENT	1.00	LS	\$ 1,000.00	\$ 1,000.00	\$ 4,000.00	\$ 4,000.00	\$ 5,000.00
018200	OPERATION AND MAINTENANCE DATA							
020000	EXISTING CONDITIONS							
024119	SELECTIVE DEMOLITION							
	REMOVE 1ST FLOOR FRAMING (SALVAGE JOISTS)	3500.00	SF	\$ 2.00	\$ 7,000.00	\$ 8.00	\$ 12.00	\$ 7,012.00
	REMOVE CONCRETE STAIR AT AREAWAY	17.00	RFT	\$ 250.00	\$ 4,250.00	\$ 500.00	\$ 8,500.00	\$ 12,750.00
	REMOVE INTERIOR PARTITIONS	6500.00	SF	\$ 1.00	\$ 6,500.00	\$ 3.00	\$ 19,500.00	\$ 26,000.00
	REMOVE DOORS & FRAMES							
	- SINGLE	21.00	EA	\$ 25.00	\$ 525.00	\$ 100.00	\$ 2,100.00	\$ 2,625.00
	- DOUBLE	1.00	PAIRS	\$ 50.00	\$ 50.00	\$ 200.00	\$ 200.00	\$ 250.00
	REMOVE HATCH & SURROUNDING SIDEWALK	1.00	LS	\$ 300.00	\$ 300.00	\$ 750.00	\$ 750.00	\$ 1,050.00
	REMOVE OH DOOR	3.00	EA	\$ 500.00	\$ 1,500.00	\$ 1,500.00	\$ 4,500.00	\$ 6,000.00
	REMOVE STOREFRONT	400.00	SF	\$ 5.00	\$ 2,000.00	\$ 10.00	\$ 4,000.00	\$ 6,000.00
	SAWCUT, SHORE & REMOVE EXTERIOR MASONRY WALL FOR NEW OPENING	30.00	SF	\$ 20.00	\$ 600.00	\$ 50.00	\$ 1,500.00	\$ 2,100.00
	REMOVE STAIR & RAILINGS	1.00	FLIGHT	\$ 300.00	\$ 300.00	\$ 1,000.00	\$ 1,000.00	\$ 1,300.00
	REMOVE SUBFLOORING	3000.00	SF	\$ 2.00	\$ 6,000.00	\$ 8.00	\$ 24,000.00	\$ 30,000.00
	CUT OPENINGS IN EXIST. FLOOR FRAMING FOR NEW OPENINGS	700.00	SF	\$ 5.00	\$ 3,500.00	\$ 10.00	\$ 7,000.00	\$ 10,500.00
	FLOOR DRAIN TRENCHES ON 1ST FLOOR (8" X 6") AS PER 2.9402	7.00	LF	\$ 35.00	\$ 245.00	\$ 50.00	\$ 350.00	\$ 595.00
	REMOVE INTERIOR WINDOWS	3.00	EA	\$ 100.00	\$ 300.00	\$ 500.00	\$ 1,500.00	\$ 1,800.00
	REMOVE ROOFING	4245.00	SF	\$ 1.00	\$ 4,245.00	\$ 5.00	\$ 21,225.00	\$ 25,470.00
	REMOVE LATISER	1.00	EA	\$ 100.00	\$ 100.00	\$ 200.00	\$ 200.00	\$ 300.00
	GRIND DOWN SLOPING CONC. FLOOR	1869.00	SF	\$ 2.00	\$ 3,738.00	\$ 5.00	\$ 9,945.00	\$ 13,923.00
	REMOVE SUBFLOORING/ ROOF DECK FOR MECHANICAL PENETRATIONS	6.00	LOC	\$ 200.00	\$ 1,200.00	\$ 300.00	\$ 1,800.00	\$ 3,000.00
	REMOVE TERRACOTTA COPINGS	300.00	LF	\$ 5.00	\$ 1,500.00	\$ 10.00	\$ 3,000.00	\$ 4,500.00
	CAP EXISTING CHIMNEY CAP	5.00	EA	\$ 50.00	\$ 250.00	\$ 100.00	\$ 500.00	\$ 750.00
	TEMPORARY CONSTRUCTION BARRICADES	2000.00	SF	\$ 2.00	\$ 4,000.00	\$ 4.00	\$ 8,000.00	\$ 12,000.00
	PROTECT EXISTING STAIRS TO REMAIN	14.00	FLIGHTS	\$ 300.00	\$ 4,200.00	\$ 1,000.00	\$ 14,000.00	\$ 18,200.00
	TEMP. PROTECTION @ ROOF	4245.00	SF	\$ 1.00	\$ 4,245.00	\$ 2.00	\$ 8,490.00	\$ 12,735.00
	MISC. DEMOLITION	1.00	LS	\$ 1,500.00	\$ 1,500.00	\$ 5,000.00	\$ 5,000.00	\$ 6,500.00
	REMOVE, SALVAGE, STORE & PROTECT FURNITURE & EQUIPMENT							

[illegible]

	PAINT MASONRY WALLS	7,400.00	SF	\$0.50	\$ 3,700.00	\$1.50	\$ 11,100.00	\$ 14,800.00
	PAINT DOORS & FRAMES							
	- HM DOORS & FRAMES	46.00	LVS	\$50.00	\$ 2,300.00	\$150.00	\$ 6,900.00	\$ 9,200.00
	- WD DOORS & FRAMES	14.00	LVS	\$50.00	\$ 700.00	\$150.00	\$ 2,100.00	\$ 2,800.00
	PAINT GWB CEILING/FASCIA/COVES	12,942.00	SF	\$0.50	\$ 6,471.00	\$1.50	\$ 19,413.00	\$ 25,884.00
	PAINT PLYWOOD SUBFLOOR	10,705.00	SF	\$0.50	\$ 5,352.50	\$1.50	\$ 16,057.50	\$ 21,410.00
	PAINT PLYWOOD BASE	412.00	LF	\$0.50	\$ 206.00	\$4.00	\$ 1,648.00	\$ 1,854.00
	PAINT CASED OPENING	108.00	LF	\$ 54.00	\$ 5,832.00	\$ 216.00	\$ 17,136.00	\$ 23,000.00
	PAINT HARDWOOD SILL	1223.00	LF	\$ 611.50	\$ 747,845.00	\$ 3,046.00	\$ 2,478,500.00	\$ 3,276,345.00
	PAINT CAP @ HALF WALL	42.00	LF	\$ 0.50	\$ 21.00	\$ 3.00	\$ 126.00	\$ 147.00
	INCLUDED WITH CONCRETE							
	SEALED CONC. FLOORING	1,118.00	SF	\$2.00	\$ 2,236.00	\$6.00	\$ 6,714.00	\$ 8,950.00
	EPOXY WP SEALER ON NEW STAIR TREADS & LANDINGS	65.00	SF	\$2.00	\$ 130.00	\$6.00	\$ 390.00	\$ 520.00
	EPOXY WP SEALER ON NEW BOILER ROOM FLOOR	N/A						
	PAINT EXPOSED DUCTWORK	200.00	LF	\$2.00	\$ 400.00	\$8.00	\$ 1,600.00	\$ 2,000.00
	LYNELS				\$ 27,184.00		\$ 84,931.50	\$ 112,115.50
	SUBTOTAL							
	BREATHABLE MASONRY COATING							
099200								
	INTUMESCENT FIREPROOFING							
099846	SPRAY ON FIREPROOFING (ON ALL STRUCTURAL STEEL) [Not in drawings and specs]	N/A						
	SUBTOTAL							
109000	SPECIALTIES							
102113	FLOOR MOUNTED TOILET PARTITIONS (See Other Breakdown)	5.00	EA	\$ 2,500.00	\$ 12,500.00	\$ 2,500.00	\$ 12,500.00	\$ 25,000.00
	TOILET PARTITIONS 2 1/2" x 4 ea. 375x1ea	N/A	EA					
	TOILET PARTITIONS - ADA COMPLIANT [not found in drawings]							
	SUBTOTAL							
102800	TOILET & UTILITY ACCESSORIES							
	PAPER TOWEL DISP	6.00	EA	\$150.00	\$ 900.00	\$300.00	\$ 1,800.00	\$ 2,700.00
	TOILET PAPER HOLDER	11.00	EA	\$100.00	\$ 1,100.00	\$200.00	\$ 2,200.00	\$ 3,300.00
	18" X 36" ST. STL MIRROR	6.00	EA	\$500.00	\$ 3,000.00	\$1,000.00	\$ 6,000.00	\$ 9,000.00
	LAV. MOUNTED SOAP DISP	6.00	EA	\$125.00	\$ 750.00	\$250.00	\$ 1,500.00	\$ 2,250.00
	36" ST. STL GRAB BAR	9.00	EA	\$100.00	\$ 900.00	\$200.00	\$ 1,800.00	\$ 2,700.00
	42" ST. STL GRAB BAR	9.00	EA	\$400.00	\$ 3,600.00	\$800.00	\$ 7,200.00	\$ 10,800.00
	SUBTOTAL							
104000	SIGNAGE							
	INTERIOR SIGNAGE	1.00	LS	\$ 5,000.00	\$ 5,000.00	\$ 10,000.00	\$ 10,000.00	\$ 15,000.00
	EXTERIOR ST. STL SIGNAGE LETTERS	19.00	EA	\$100.00	\$ 1,900.00	\$200.00	\$ 3,800.00	\$ 5,700.00
	RESTORE & REINSTALL EXIST BRAC SIGNAGE LETTERS	19.00	EA	\$100.00	\$ 1,900.00	\$200.00	\$ 3,800.00	\$ 5,700.00
	PAINTED GRAPHICS (ON MASONRY)	1.00	LS	\$ 20,000.00	\$ 20,000.00	\$ 100,000.00	\$ 100,000.00	\$ 120,000.00
	SUBTOTAL							
105113	FIRE EXTINGUISHERS AND CABINETS							
	FLAMMABLE LIQUIDS CABINETS	6.00	EA	\$1,000.00	\$ 6,000.00	\$1,000.00	\$ 6,000.00	\$ 12,000.00
	SUBTOTAL							
120000	FURNISHINGS							
064000	CABINETRY & MILLWOD							
	CASED OPENING @ SERVICE WINDOW	108.00	LF	\$15.00	\$ 1,620.00	\$20.00	\$ 2,160.00	\$ 3,780.00
	1 1/4" HARDWOOD SILL	1223.00	LF	\$15.00	\$ 18,345.00	\$20.00	\$ 24,460.00	\$ 42,805.00
	HARDWOOD CAP @ HALF WALL	42.00	LF	\$15.00	\$ 630.00	\$20.00	\$ 840.00	\$ 1,470.00
	PLYWOOD SUBFLOOR (INCLUDED WITH SHEETING)	10,705.00	SF					
	SUBTOTAL							
124813	ENTRANCE FLOOR MATS & FRAMES							
	ENTRANCE WIPE-OFF MATS	153.00	SF	\$15.00	\$ 2,295.00	\$45.00	\$ 6,885.00	\$ 9,180.00
	SUBTOTAL							
140000	CONVEYING SYSTEMS							
142120	COUNTERWEIGHTED ROPE OIL HYDRAULIC ELEVATOR	1.00	EA	\$85,000.00	\$ 85,000.00	\$125,000.00	\$ 125,000.00	\$ 210,000.00
	5 STOP ELEVATOR							
	SUBTOTAL							
210000	FIRE PROTECTION (LUMP SUM)	1.00	LS	\$ 70,000.00	\$ 70,000.00	\$ 105,000.00	\$ 105,000.00	\$ 175,000.00

[illegible]

[illegible]

280000	DATA OUTLET 1C	28.00	EA		\$	4,200.00	\$	7,345.00	\$	11,545.00
280500	WAP OUTLET 1C	10.00	EA		\$	2,600.00	\$	2,900.00	\$	5,500.00
280513	TEL/DATA OUTLET 2C	40.00	EA		\$	4,600.00	\$	11,200.00	\$	15,800.00
	TEL/DATA OUTLET 2C WP	3.00	EA		\$	1,280.00	\$	1,800.00	\$	2,880.00
	TEL/DATA OUTLET 5C	1.00	EA		\$	680.00	\$	690.00	\$	1,370.00
	TEL OUTLET 4C		EA		\$		\$	47,410.00	\$	73,580.00
	SUBTOTAL					26,170.00				
280000	ELECTRONIC SAFETY AND SECURITY									
280500	COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY									
280513	CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY									
	3/4" RIGID, 3#10	500.00	LF							
	2" RIGID, RISER CONDUIT	100.00	LF							
	3/4" EMT, #12	3000.00	LF							
	3/4" EMT, #12	3300.00	LF							
	TEFLON CABLE	9900.00	LF							
	3/4" EMT	500.00	LF							
	1" EMT	500.00	LF							
	2" EMT	200.00	LF							
	TEFLON CABLE 1PR#18	3100.00	LF							
	TEFLON CABLE 4PR#18	8200.00	LF							
	CAT 6E	1500.00	LF							
	SUBTOTAL				\$	35,800.00	\$	69,900.00	\$	105,700.00
280600	INTRUSION DETECTION (FURNISH)									
	23	1.00	LS							
	DVR MONITORING	1.00	LS							
	UPS, 1500 VA	1.00	EA							
	BATTERY BACKUP	1.00	EA							
	MOTION SENSOR	12.00	EA							
	SIREN W/ STROBE	2.00	EA							
	DOOR CONTACT	23.00	EA							
	KEYPAD	4.00	EA							
	CCTV CAMERA	6.00	EA							
	CCTV CAMERA WP	7.00	EA							
	INTERCOM STATION	1.00	EA							
	INTERCOM STATION WP	5.00	EA							
	SUBTOTAL				\$	24,000.00	\$	54,000.00	\$	78,000.00
283111	DIGITAL ADDRESSABLE FIRE-ALARM SYSTEM (FURNISH)									
	PULL STATION	12.00	EA							
	AUDIBLE VISUAL	25.00	EA							
	SMOKE HEAT DETECTOR	22.00	EA							
	STROBE	11.00	EA							
	HORN		EA							
	DUCT DETECTOR	2.00	EA							
	ANNUNCIATOR	1.00	EA							
	CENTRAL EQUIPMENT	2.00	LS							
	FU CUTOFF	2.00	EA							
	PURGE KEY		EA							
	MISC CONNECTIONS	15.00	EA							
	FIRE SMOKE DAMPER CONNECTIONS	21.00	EA							
	SUBTOTAL				\$	23,000.00	\$	53,000.00	\$	76,000.00
310000	EARTHWORK									
312000	EARTHWORK									
	6" GRAVEL SUBBASE	72.00	CY		\$50.00	3,600.00	\$	7,200.00	\$	10,800.00
	SUBTOTAL				\$	3,600.00	\$	7,200.00	\$	10,800.00
312318	DEWATERING	1.00	LS		\$5,000.00	5,000.00	\$	15,000.00	\$	20,000.00
	SUBTOTAL				\$	5,000.00	\$	15,000.00	\$	20,000.00
315000	EXCAVATION SUPPORT AND PROTECTION									
	PROTECT EX RETAINING WALL	1.00	LS		\$2,500.00	2,500.00	\$	5,000.00	\$	7,500.00
	TEMP. SHORING PARTITIONS	280.00	SF		\$15.00	3,900.00	\$	6,500.00	\$	10,400.00
	SHORING AT NEW RETAINING WALL	320.00	SF		\$15.00	4,800.00	\$	8,000.00	\$	12,800.00
	SUBTOTAL				\$	11,200.00	\$	19,500.00	\$	30,700.00

[illegible]

Tax ID #: 11-3512788PIN#: 8502013 PV0012C**SCHEDULE B - Subcontractor Utilization Plan – Part II: Bidder/Proposer Subcontracting Plan**

This page and the next (Part II herein) are to be completed by the bidder/proposer. **AFFIRMATIONS: Bidder/proposer must check the applicable boxes below, affirming compliance with M/WBE requirements.**

Bidder/proposer ☒ **AFFIRMS** or ☐ **DOES NOT AFFIRM** [statement below]

It is a material term of the contract to be awarded that, with respect to the total amount of the contract to be awarded, bidder/proposer will award one or more subcontracts for amounts under one million dollars, sufficient to meet or exceed the Target Subcontracting Percentage (as set forth in Part I) unless it obtains a full or partial waiver thereof, and it will award subcontracts sufficient to meet or exceed the Total Participation Goals (as set forth in Part I) unless such goals are modified by the Agency.

Bidder/proposer ☒ **AFFIRMS** that it intends to meet or exceed the Target Subcontracting Percentage (as set forth in Part 1); or
☐ **AFFIRMS** that it has obtained a full/partial pre-award waiver of the Target Subcontracting Percentage (as set forth in Part I) and intends to award the modified Target Subcontracting Percentage, if any; or
☐ **DOES NOT AFFIRM**

Section I: Prime Contractor Contact Information

Tax ID # 11-3512788 FMS Vendor ID # PV467BRAC-R
 Business Name S & N Builders Inc Contact Person Sakander Raja
 Address 156 East 3rd Street, Mt. Vernon, NY 10550
 Telephone # (914) 664-8444 Email raja@snbuilders.com

Section II: General Contract Information**1. Define the industry in which work is to be performed.**

- **Construction** includes all contracts for the construction, rehabilitation, and/or renovation of physical structures. This category does include CM Build as well as other construction related services such as: demolition, asbestos and lead abatement, and painting services, carpentry services, carpet installation and removal, where related to new construction and not maintenance.
- **Professional Services** are a class of services that typically require the provider to have some specialized field or advanced degree. Services of this type include: legal, management consulting, information technology, accounting, auditing, actuarial, advertising, health services, pure construction management, environmental analysis, scientific testing, architecture and engineering, and traffic studies, and similar services.

a. Type of work on Prime Contract (Check one):**b. Type of work on Subcontract (Check all that apply):**

☒ **Construction** ☐ **Professional Services** ☒ **Construction** ☐ **Professional Services** ☐ **Other**

2. What is the expected percentage of the total contract dollar value that you expect to award to all subcontracts?

3. Will you award subcontract(s) in amounts below \$ 1 million for construction and/or professional services contracts within the first 12 months of the notice to proceed on the contract?

30 %

☒ **Yes** ☐ **No**

Section III: Subcontractor Utilization Summary

IMPORTANT: If you do not anticipate that you will subcontract at the target level the agency has specified, because you will perform more of the work yourself, you must seek a waiver of the Target Subcontracting Percentage by completing p. 9).

Step 1:	Subcontracts under \$1M (4) (construction/professional services)	Total Bid/Proposal Value	Calculated Target Subcontracting Percentage
Calculate the percentage (of your total bid) that will go towards subcontracts under \$1M for construction and/or professional services	<u>\$ 2,369,550.00</u>	<u>\$ 7,898,500.00</u>	<u>30 %</u>

- **Subcontracts under \$1M (construction/professional services):** Enter the value you expect to award to subcontractors in dollars for amounts under \$1 million for construction and/or professional services. This value defines the amount that participation goals apply to, and will be entered into the first line of Step 2.
- **Total Bid/Proposal Value:** Provide the dollar amount of the bid/proposal.
- **Calculated Target Subcontracting Percentage:** The percentage of the total contract dollar value that will be awarded to one or more subcontractors for amounts under \$1 million for construction and/or professional services. This percentage must equal or exceed the percentage listed by the agency on page 1, at line (1).

NOTE: The "Calculated Target Subcontracting Percentage" MUST equal or exceed the Target Subcontracting Percentage listed by the agency on Page 6, Line (1).

SCHEDULE B - cont.**Step 2:**

Calculate value of subcontractor participation goals

Subcontracts under \$1M
(construction/professional services)2,369,550.00 *ft. 7/3/13*

- a. Copy value from Step 1, line (4) – the total value of all expected subcontracts under \$1M for construction and/or professional services

- b. * From line a. above, allocate the dollar value of "Subcontracts under \$1M" by Construction and Professional Services,

Construction

Professional Services

- * If all subcontracts under \$1M are in one industry, enter '0' for the industry with no subcontracts.

- * Amounts listed on these lines should add up to the value from line a.

Subcontracts under \$1M by Industry2,369,550.00 *ft. 7/3/13*

\$ 0

- * For Construction enter percentage from line (2) from Page 6.

- * For Professional Services enter percentage from line (3) from Page 6.

- c. * **Total Participation Goals Percentages must be copied from Part I, lines (2) and (3).**

Total Participation Goals

x

40

%

x

0

%

- d. **Value of Total Participation Goals**

\$ 947,820.00 *ft. 7/3/13*

\$ 0

Step 3:

- ☒ **Subcontracts in Amounts Under \$1 M Scope of Work – Construction**

PLUMBING - \$ 25,000 *ft. 7/3/13*

HVAC - \$ 554,000

ELECTRICAL - \$ 104,000

Enter brief description of type(s) of subcontracts in amounts under \$1M anticipated, by type of work, not by name of subcontractor

ASBESTOS \$100,000 (MBE) MASONRY 200,000 (MBE)
 SECURITY SERVICES \$150,000 (MBE)
 STONEWORK \$200,000 (MBE) CONCRETE 150,000 (MBE)
 BRICKWORK \$300,000 (MBE) *ft. 7/8/13*

Enter brief description of type(s) of subcontracts in amounts under \$1M anticipated, by type of work, not by name of subcontractor

MBE - \$1,100,000

- ☒ **Subcontracts in Amounts Under \$1 M Scope of Work – Professional Services**

\$ 1,183,000

Section IV: Vendor Certification and Required Affirmations

I hereby 1) acknowledge my understanding of the M/WBE requirements as set forth herein and the pertinent provisions of Local Law 129 of 2005, and the rules promulgated thereunder; 2) affirm that the information supplied in support of this subcontractor utilization plan is true and correct; 3) agree, if awarded this Contract, to comply with the M/WBE requirements of this Contract and the pertinent provisions of Local Law 129 of 2005, 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 subcontract(s) sufficient to meet the Target Subcontracting Percentage, unless a waiver is obtained, and the Vendor will award subcontract(s) sufficient to meet the Total Participation Goals unless such goals are modified by the Agency; and 5) agree and affirm, if awarded this contract the Vendor intends to make all reasonable, good faith efforts to meet the Target Subcontracting Percentage, or if the Vendor has obtained a waiver, the Vendor intends to meet the modified Target Subcontracting Percentage, if any, and the Vendor intends to solicit and obtain the participation of M/WBEs so as to meet the Total Participation Goals unless modified by the Agency.

Signature *[Signature]*
 Print Name Sakander Raja

Date 5/22/2013
 Title President

BIDDER'S IDENTIFICATION OF SUBCONTRACTORS

BID ALTERNATE 2

Project ID: PV467BRAC-R

SUBMISSION: In addition to its Bid (Bid Envelope # 1), the Bidder must, at the time of the bid, complete and submit this form in a separate, sealed envelope (Bid Envelope # 2). To complete this form, the Bidder must identify the subcontractors it intends to use for the work listed below, as well as the dollar amount to be paid to each subcontractor. Failure to complete this form and submit it in a separate, sealed envelope will result in the disqualification of the bid as non-responsive.

The Bidder intends to use the following subcontractors. If the Bidder intends to do any of the work referenced below with its own forces, the Bidder should complete this form using its own name. If multiple subcontractors for any trade are proposed, Bidder may submit multiple copies of this form.

1. **PLUMBING CONTRACTOR:**

EASTERN PLUMBING
(Print Name)

NON/MBE

Agreed Amount To Be Paid To Subcontractor: \$ 25,000.00

2. **HVAC CONTRACTOR:**

MIDTOWN HVAC ENTERPRISES
(Print Name)

NON/MBE

Agreed Amount To Be Paid To Subcontractor: \$ 554,000.00

3. **ELECTRICAL CONTRACTOR:**

RYAN ELECTRIC
(Print Name)

NON/MBE

Agreed Amount To Be Paid To Subcontractor: \$ 104,000.-

BIDDER'S SIGNATURE: The Bidder must sign this form in the space provided below:

Name of Bidder:

SEN BOLDERS

By:

[Signature]
Signature of Partner or Corporate Officer

Print Name:

SAKANDER RIN

Title:

President



BID BOND 1
FORM OF BID BOND

KNOW ALL MEN BY THESE PRESENTS. That we, S & N Builders, Inc.
156 E 3rd St, Mt. Vernon, NY 10550

hereinafter referred to as the "Principal", and Westchester Fire Insurance Company
10 Exchange Place, 13th Floor, Jersey City, NJ 07302

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 AMOUNT BID

(10% Amt Bid), 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 _____

Bronx River Art Center Renovation, Contract no. PV467BRAC-R

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.

BID BOND 2

In the event that the Proposal of the Principal shall be accepted and the Contract be awarded to him 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 20th day of May, 2013.

(Seal)

S & N Builders, Inc.

(L.S.)

Principal

By:

[Signature]
Safar Kray
President

(Seal)

Westchester Fire Insurance Company

Surety

By:


[Signature]
Susan P. Hammel
Attorney-in-Fact

BID BOND 3

ACKNOWLEDGEMENT OF PRINCIPAL, IF A CORPORATION

State of New York County of Westchester ss:
On this 28 day of May, 2013, before me personally came
Sakander Raja to me known, who, being by me duly sworn, did depose and say that he
resides at Garden City, NY
that he is the President of S & N Builders, Inc.
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.

ADNAN RAJA
NOTARY PUBLIC, State of New York
No. 01RA6134415
Qualified in Nassau County
Commission Expires October 03, 2013



Notary Public

ACKNOWLEDGEMENT 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

ACKNOWLEDGEMENT 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

AFFIX ACKNOWLEDGEMENTS AND JUSTIFICATION OF SURETIES

ACKNOWLEDGEMENT OF PRINCIPAL, OF A CORPORATION

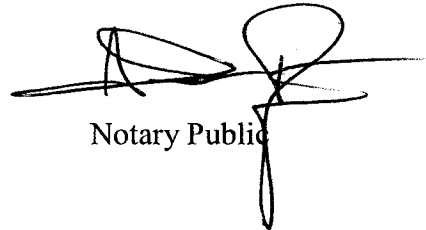
STATE OF New York

COUNTY OF Westchester

SS:

On this 28 day of May, 2013 before me personally came Sakander Raja to me known, who, being by me duly sworn did depose and say that he resides at Garden City, NY that he is the President of S & N Builders, Inc. 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 the foregoing instrument is such seal; that it was an affixed by order of the board of directors of said corporation; and that he signed his name thereto by like order.

ADNAN RAJA
NOTARY PUBLIC, State of New York
No. 01RA6134415
Qualified in Nassau County
Commission Expires October 03, 2013


Notary Public

STATE OF NY

SS:

COUNTY OF Nassau

On this 20th day of May, 2013, before me personally came Susan P. Hammel to me known, who, being by me duly sworn, did depose and say that he is an Attorney-In-Fact of Westchester Fire Insurance Company the corporation described in and which executed the within instrument; that he knows the corporate seal of said corporation; that the seal affixed to the within instrument is such corporate seal, and that he signed and said instrument and affixed the said seal as Attorney-In-Fact by authority of the Board of Directors of said corporation and by authority of this office under the Standing Resolutions thereof.

My commission expires _____

LYNN ANN INFANTI
Notary Public, State of New York
No. 011N6004351
Qualified in Suffolk County
Commission Expires March 23, 2014


Notary Public

Power of Attorney

WESTCHESTER FIRE INSURANCE COMPANY

Know all men by these presents: That WESTCHESTER FIRE INSURANCE COMPANY, a corporation of the Commonwealth of Pennsylvania pursuant to the following Resolution, adopted by the Board of Directors of the said Company on December 11, 2006, to wit:

"RESOLVED, that the following authorizations relate to the execution, for and on behalf of the Company, of bonds, undertakings, recognizances, contracts and other written commitments of the Company entered into the ordinary course of business (each a "Written Commitment"):

- (1) Each of the Chairman, the President and the Vice Presidents of the Company is hereby authorized to execute any Written Commitment for and on behalf of the Company, under the seal of the Company or otherwise.
- (2) Each duly appointed attorney-in-fact of the Company is hereby authorized to execute any Written Commitment for and on behalf of the Company, under the seal of the Company or otherwise, to the extent that such action is authorized by the grant of powers provided for in such persons written appointment as such attorney-in-fact.
- (3) Each of the Chairman, the President and the Vice Presidents of the Company is hereby authorized, for and on behalf of the Company, to appoint in writing any person the attorney-in-fact of the Company with full power and authority to execute, for and on behalf of the Company, under the seal of the Company or otherwise, such Written Commitments of the Company as may be specified in such written appointment, which specification may be by general type or class of Written Commitments or by specification of one or more particular Written Commitments.
- (4) Each of the Chairman, the President and Vice Presidents of the Company is hereby authorized, for and on behalf of the Company, to delegate in writing any other officer of the Company the authority to execute, for and on behalf of the Company, under the Company's seal or otherwise, such Written Commitments of the Company as are specified in such written delegation, which specification may be by general type or class of Written Commitments or by specification of one or more particular Written Commitments.
- (5) The signature of any officer or other person executing any Written Commitment or appointment or delegation pursuant to this Resolution, and the seal of the Company, may be affixed by facsimile on such Written Commitment or written appointment or delegation.

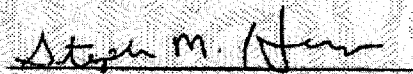
FURTHER RESOLVED, that the foregoing Resolution shall not be deemed to be an exclusive statement of the powers and authority of officers, employees and other persons to act for and on behalf of the Company, and such Resolution shall not limit or otherwise affect the exercise of any such power or authority otherwise validly granted or vested.

Does hereby nominate, constitute and appoint Joseph Sforzo, Robert M Kempner, Robert W O'Kane, Susan P Hammel, all of the City of PLAINVIEW, New York, each individually if there be more than one named, its true and lawful attorney-in-fact, to make, execute, seal and deliver on its behalf, and as its act and deed any and all bonds, undertakings, recognizances, contracts and other writings in the nature thereof in penalties not exceeding Five million dollars & zero cents (\$5,000,000.00) and the execution of such writings in pursuance of these presents shall be as binding upon said Company, as fully and amply as if they had been duly executed and acknowledged by the regularly elected officers of the Company at its principal office.

IN WITNESS WHEREOF, the said Stephen M. Haney, Vice-President, has hereunto subscribed his name and affixed the Corporate seal of the said WESTCHESTER FIRE INSURANCE COMPANY this 16 day of October 2012.

WESTCHESTER FIRE INSURANCE COMPANY




Stephen M. Haney, Vice President

COMMONWEALTH OF PENNSYLVANIA
COUNTY OF PHILADELPHIA ss.

On this 16 day of October, AD. 2012 before me, a Notary Public of the Commonwealth of Pennsylvania in and for the County of Philadelphia came Stephen M. Haney, Vice-President of the WESTCHESTER FIRE INSURANCE COMPANY to me personally known to be the individual and officer who executed the preceding instrument, and he acknowledged that he executed the same, and that the seal affixed to the preceding instrument is the corporate seal of said Company; that the said corporate seal and his signature were duly affixed by the authority and direction of the said corporation, and that Resolution, adopted by the Board of Directors of said Company, referred to in the preceding instrument, is now in force.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my official seal at the City of Philadelphia the day and year first above written.




Notary Public

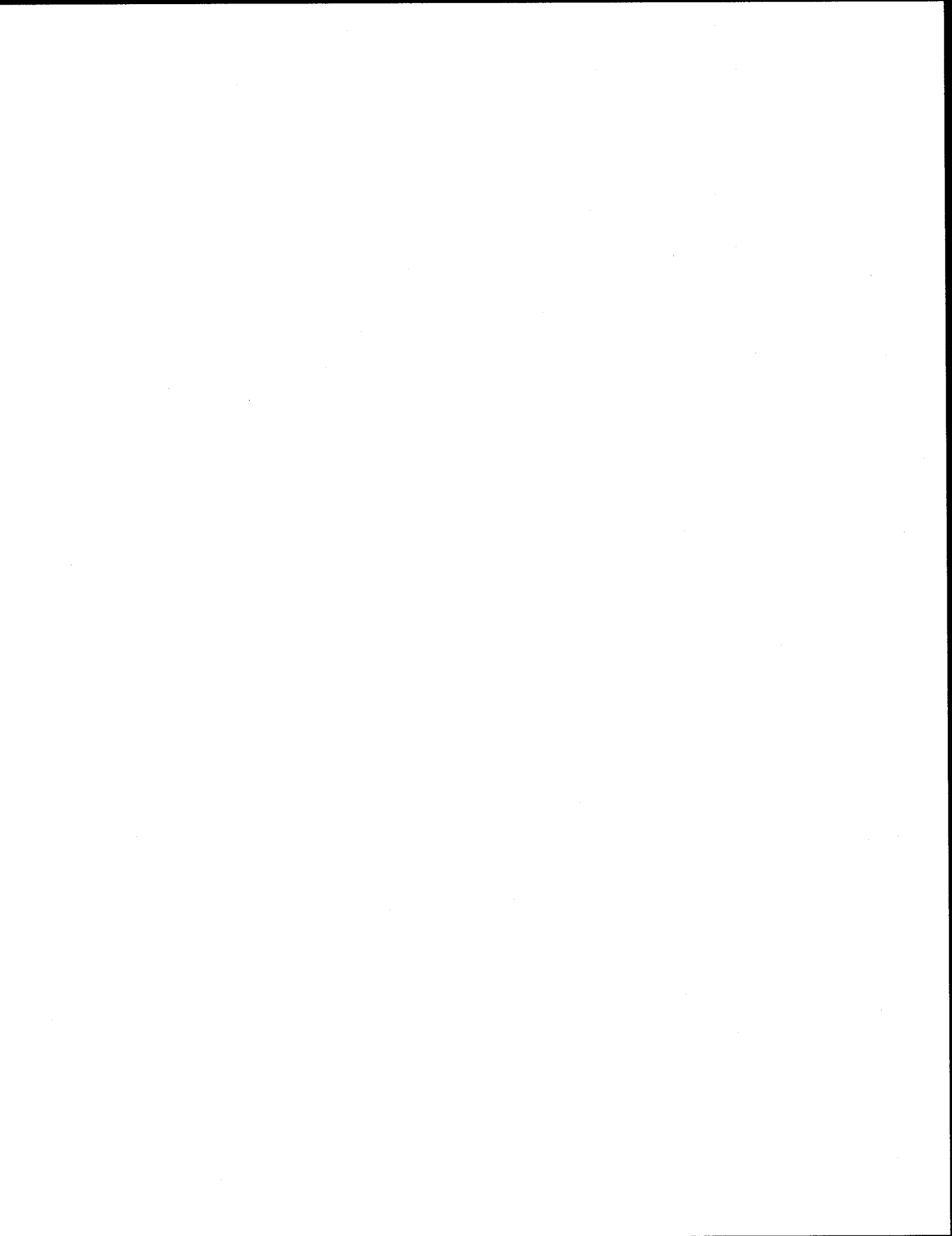
I, the undersigned Assistant Secretary of the WESTCHESTER FIRE INSURANCE COMPANY, do hereby certify that the original POWER OF ATTORNEY, of which the foregoing is a substantially true and correct copy, is in full force and effect.

In witness whereof, I have hereunto subscribed my name as Assistant Secretary, and affixed the corporate seal of the Corporation, this 20th day of May 2013




William L. Kelly, Assistant Secretary

THIS POWER OF ATTORNEY MAY NOT BE USED TO EXECUTE ANY BOND WITH AN INCEPTION DATE AFTER October 16, 2014.



FINANCIAL STATEMENT

DECEMBER 31, 2012

ADMITTED ASSETS

BONDS	\$1,915,932,115
SHORT - TERM INVESTMENTS	22,465,390
STOCKS	0
REAL ESTATE	0
CASH ON HAND AND IN BANK	(41,292,474)
PREMIUM IN COURSE OF COLLECTION*	56,678,650
INTEREST ACCRUED	17,136,830
OTHER ASSETS	148,350,304
TOTAL ASSETS	<u>\$2,119,270,815</u>

LIABILITIES

RESERVE FOR UNEARNED PREMIUMS	\$215,324,197
RESERVE FOR LOSSES	1,103,762,744
RESERVE FOR TAXES	3,515,562
FUNDS HELD UNDER REINSURANCE TREATIES	4,484,136
OTHER LIABILITIES	(21,519,017)
TOTAL LIABILITIES	<u>1,305,567,622</u>


CAPITAL: 70,000 SHARES, \$71.43 PAR VALUE	5,000,100
CAPITAL: PAID IN	292,187,374
AGGREGATE WRITE-INS FOR SPECIAL SURPLUS FUNDS	111,710,473
SURPLUS (UNASSIGNED)	404,805,246
SURPLUS TO POLICYHOLDERS	<u>813,703,193</u>
TOTAL	<u>\$2,119,270,815</u>

(*EXCLUDES PREMIUM MORE THAN 90 DAYS DUE.)

STATE OF PENNSYLVANIA

COUNTY OF PHILADELPHIA

John P. Taylor, being duly sworn, says that he is Vice President of Westchester Fire Insurance Company and that to the best of his knowledge and belief the foregoing is a true and correct statement of the said Company's financial condition as of the 31 st day of December, 2012.

Sworn before me this March 15, 2013
Vice President
Notary PublicAugust 8, 2015
My commission expires

COMMONWEALTH OF PENNSYLVANIA

Notarial Seal

Diane Wright, Notary Public
City of Philadelphia, Philadelphia County
My Commission Expires Aug. 8, 2015

MEMBER, PENNSYLVANIA ASSOCIATION OF NOTARIES

VENDEX COMPLIANCE

(A) **Vendex Fees:** Pursuant to Procurement Policy Board Rule 2-08(f)(2), the contractor will be charged a fee for the administration of the VENDEX system, including the Vendor Name Check process, if a Vendor Name Check review is required to be conducted by the Department of Investigation. The contractor shall also be required to pay the applicable required fees for any of its subcontractors for which Vendor Name Check reviews are required. The fee(s) will be deducted from payments made to the contractor under the contract. For contracts with an estimated value of less than or equal to \$1,000,000, the fee will be \$175 per Vendor Name Check review. For contracts with an estimated value of greater than \$1,000,000, the fee will be \$350 per Vendor Name Check review.

(B) **Confirmation of Vendex Compliance:** The Bidder shall submit this Confirmation of Vendex Compliance to the Department of Design and Construction, Contracts Section, 30-30 Thomson Avenue – First Floor, Long Island City, NY 11101.

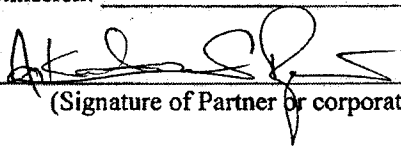
Bid Information: The Bidder shall complete the bid information set forth below.

Name of Bidder: S & N Builders, Inc.
Bidder's Address: 156 East 3rd Street, Mt. Vernon, NY 10550
Bidder's Telephone Number: 914-664-8444
Bidder's Fax Number: 914-664-8445
Date of Bid Opening: 6/20/13
Project ID: PV467BRAC

Vendex Compliance: To demonstrate compliance with Vendex requirements, the Bidder shall complete either Section (1) or Section (2) below, whichever applies.

- (1) **Submission of Vendex Questionnaires to MOCS:** By signing in the space provided below, the Bidder certifies that as of the date specified below, the Bidder has submitted Vendex Questionnaires to the Mayor's Office of Contract Services, Attn: VENDEX, 253 Broadway, 9th Floor, New York, New York 10007.

Date of Submission: 03/27/2013

By: 
(Signature of Partner or corporate officer)

Print Name: Sakander Raja

- (2) **Submission of Certification of No Change to DDC:** By signing in the space provided below, the Bidder certifies that it has read the instructions in a "Vendor's Guide to Vendex" and that such instructions do not require the Bidder to submit Vendex Questionnaires. The Bidder has completed **TWO ORIGINALS** of the Certification of No Change set forth on the next page of this Bid Booklet.

By: _____
(Signature of Partner or corporate officer)

Print Name: _____

DIRECTIONS: Please execute two originals (both with original signature).
Please forward directly to the agency (not M.O.C.S.).



Certificate of No Change Form

- Please submit two completed forms. Copies will not be accepted.
- Please send both copies to the agency that requested it, unless you are advised to send it directly to the Mayor's Office of Contract Services (MOCS).
- A materially false statement willfully or fraudulently made in connection with this certification, and/or the failure to conduct appropriate due diligence in verifying the information that is the subject of this certification, may result in rendering the submitting entity non-responsible for the purpose of contract award.
- A materially false statement willfully or fraudulently made in connection with this certification may subject the person making the false statement to criminal charges.

I, Sakander Raja, being duly sworn, state that I have read
Enter Your Name

and understand all the items contained in the vendor questionnaire and any submission of change as identified on page one of this form and certify that as of this date, these items have not changed. I further certify that, to the best of my knowledge, information and belief, those answers are full, complete, and accurate; and that, to the best of my knowledge, information, and belief, those answers continue to be full, complete, and accurate.

In addition, I further certify on behalf of the submitting vendor that the information contained in the principal questionnaire(s) and any submission of change identified on page two of this form have not changed and have been verified and continue, to the best of my knowledge, to be full, complete and accurate.

I understand that the City of New York will rely on the information supplied in this certification as additional inducement to enter into a contract with the submitting entity.

Vendor Questionnaire *This section is required.*

This refers to the vendor questionnaire(s) submitted for the vendor doing business with the City.

Name of Submitting Entity: S&N Builders, Inc

Vendor's Address: 156 E 3rd Street, Mt. Vernon, NY 10550

Vendor's EIN or TIN: 11-3512788 Requesting Agency: NYC DDC

Are you submitting this Certification as a parent? (Please circle one) ☒ Yes ☐ No

Signature date on the last full vendor questionnaire signed for the submitting vendor: 3/27/2013

Signature date on change submission for the submitting vendor: N/A

Principal Questionnaire

This section refers to the most recent principal questionnaire submissions.



	Principal Name	Date of signature on last full Principal Questionnaire	Date(s) of signature on submission of change
1	Sakander Raja	03/27/2013	
2			
3			
4			
5			
6			

☐ Check if additional changes were submitted and attach a document with the date of additional submissions.

Certification This section is required.

This form must be signed and notarized. Please complete this twice. Copies will not be accepted.

Certified By:

Sakander Raja

Name (Print)

President

Title

S & N Builders, Inc.

Name of Submitting Entity

Signature

11/13/13
Date

Notarized By:

Notary Public

County License Issued

License Number

Sworn to before me on: 11/13/2013
Date

PUNNIYAKUMARI MUTHUVEL
NOTARY PUBLIC-STATE OF NEW YORK
No. 01MU6283472
Qualified In Queens County
My Commission Expires June 03, 2017

The City of New York Department of Small Business Services
Division of Labor Services Contract Compliance Unit
110 William Street, New York, New York 10038
Phone: (212) 513 - 6323
Fax: (212) 618-8879

CONSTRUCTION EMPLOYMENT REPORT

GENERAL INFORMATION

1. Your contractual relationship in this contract is: Prime contractor ☒ Subcontractor ☐
- 1a. Are M/WBE goals attached to this project? Yes ☒ No ☐
2. Please check one of the following if your firm would like information on how to certify with the City of New York as a:
☒ Minority Owned Business Enterprise ☐ Locally based Business Enterprise
☐ Women Owned Business Enterprise ☐ Emerging Business Enterprise
- 2a. If you are certified as an **MBE, WBE, or LBE**, what city/state agency are you certified with?
NYS, NYC Small Business Services Are you DBE certified? Yes ☐ No ☒
3. Please indicate if you would like assistance from SBS in identifying certified M/WBEs for contracting opportunities: Yes ☒ No ☐
4. Is this project subject to a project labor agreement? Yes ☒ No ☐

PART I: CONTRACTOR/SUBCONTRACTOR INFORMATION

5. 11-3512788 raja@snbuilders.com
Employer Identification Number or Federal Tax I.D./ Email Address
6. S & N Builders, Inc
Company Name
7. 156 East 3rd Street, Mt. Vernon, NY 10550
Company Address and Zip Code
8. Sakander Raja 914-664-8444
Chief Operating Officer Telephone Number
9. Sakander Raja 914-664-8444
Designated Equal Opportunity Compliance Officer Telephone Number
(If same as Item #7, write "same")
10. SAME
Name of Prime Contractor and Contact Person
(If same as Item #5, write "same")
11. Number of employees in your company: 7

12. Contract information:

- (a) DDC
Contracting Agency (City Agency)
- (b) \$7,179,000.00
Contract Amount
- (d) 8502013PV0012C
Procurement Identification Number (PIN)
- (e) _____
Contract Registration Number (CT#)
- (f) TBD
Projected Commencement Date
- (g) TBD
Projected Completion Date

(h) Description and location of proposed contract:
Bronx River Art Center Renovation - Borough of Bronx

13. Has your firm been reviewed by the Division of Labor Services (DLS) within the past 36 months and issued a Certificate of Approval? Yes x No _____

If yes, attach a copy of certificate.

14. Has DLS within the past month reviewed an Employment Report submission for your company and issued a Conditional Certificate of Approval? Yes _____ No x

If yes, attach a copy of certificate.

NOTE: DLS WILL NOT ISSUE A CONTINUED CERTIFICATE OF APPROVAL IN CONNECTION WITH THIS CONTRACT UNLESS THE REQUIRED CORRECTIVE ACTIONS IN PRIOR CONDITIONAL CERTIFICATES OF APPROVAL HAVE BEEN TAKEN.

15. Has an Employment Report already been submitted for a different contract (not covered by this Employment Report) for which you have not yet received compliance certificate? Yes _____ No x

If yes,

Date submitted: _____
Agency to which submitted: _____
Name of Agency Person: _____
Contract No: _____
Telephone: _____

16. Has your company in the past 36 months been audited by the United States Department of Labor, Office of Federal Contract Compliance Programs (OFCCP)? Yes _____ No x

If yes,

(a) Name and address of OFCCP office.

(b) Was a Certificate of Equal Employment Compliance issued within the past 36 months? Yes _____ No x

If yes, attach a copy of such certificate.

- (c) Were any corrective actions required or agreed to? Yes___ No x

If yes, attach a copy of such requirements or agreements.

- (d) Were any deficiencies found? Yes___ No x

If yes, attach a copy of such findings.

17. Is your company or its affiliates a member or members of an employers' trade association which is responsible for negotiating collective bargaining agreements (CBA) which affect construction site hiring? Yes___ No x

If yes, attach a list of such associations and all applicable CBA's.

PART II: DOCUMENTS REQUIRED

18. For the following policies or practices, attach the relevant documents (e.g., printed booklets, brochures, manuals, memoranda, etc.). If the policy(ies) are unwritten, attach a full explanation of the practices. See instructions.

PLEASE SEE ATTACHED EXPLANATIONS.

- ___ (a) Health benefit coverage/description(s) for all management, nonunion and union employees (whether company or union administered)
- ___ (b) Disability, life, other insurance coverage/description
- ___ (c) Employee Policy/Handbook
- ___ (d) Personnel Policy/Manual
- ___ (e) Supervisor's Policy/Manual
- ___ (f) Pension plan or 401k coverage/description for all management, nonunion and union employees, whether company or union administered
- ___ (g) Collective bargaining agreement(s).
- ___ (h) Employment Application(s)
- ___ (i) Employee evaluation policy/form(s).
- ___ (j) Does your firm have medical and/or non-medical (i.e. education, military, personal, pregnancy, child care) leave policy?

19. To comply with the Immigration Reform and Control Act of 1986 when and of whom does your firm require the completion of an I-9 Form?

- | | | |
|--|--------------|-------------|
| (a) Prior to job offer | Yes <u>x</u> | No ___ |
| (b) After a conditional job offer | Yes ___ | No <u>x</u> |
| (c) After a job offer | Yes ___ | No <u>x</u> |
| (d) Within the first three days on the job | Yes ___ | No <u>x</u> |
| (e) To some applicants | Yes ___ | No <u>x</u> |
| (f) To all applicants | Yes <u>x</u> | No ___ |
| (g) To some employees | Yes ___ | No <u>x</u> |
| (h) To all employees | Yes <u>x</u> | No ___ |

20. Explain where and how completed I-9 Forms, with their supportive documentation, are maintained and made accessible.

In most cases, drivers license and a completed form showing employees' social security numbers are required prior to work. When workforce is being sent from the Union, we leave the responsibility of work eligibility to the Union.

21. Does your firm or any of its collective bargaining agreements require job applicants to take a medical examination? Yes___ No x

If yes, is the medical examination given:

- | | |
|-----------------------------------|--------------|
| (a) Prior to a job offer | Yes___ No___ |
| (b) After a conditional job offer | Yes___ No___ |
| (c) After a job offer | Yes___ No___ |
| (d) To all applicants | Yes___ No___ |
| (e) Only to some applicants | Yes___ No___ |

If yes, list for which applicants below and attach copies of all medical examination or questionnaire forms and instructions utilized for these examinations.

22. Do you have a written equal employment opportunity (EEO) policy? Yes x No___

If yes, list the document(s) and page number(s) where these written policies are located.

These one page policies are posted on each job site.

23. Does the company have a current affirmative action plan(s) (AAP)

x Minorities and Women
____ Individuals with handicaps
____ Other. Please specify _____

24. Does your firm or collective bargaining agreement(s) have an internal grievance procedure with respect to EEO complaints? Yes___ No___

If yes, please attach a copy of this policy.

If no, attach a report detailing your firm's unwritten procedure for handling EEO complaints.

25. Has any employee, within the past three years, filed a complaint pursuant to an internal grievance procedure or with any official of your firm with respect to equal employment opportunity? Yes___ No x

If yes, attach an internal complaint log. See instructions.

26. Has your firm, within the past three years, been named as a defendant (or respondent) in any administrative or judicial action where the complainant (plaintiff) alleged violation of any anti-discrimination or affirmative action laws? Yes___ No x

If yes, attach a log. See instructions.

27. Are there any jobs for which there are physical qualifications? Yes x No

If yes, list the job(s), submit a job description and state the reason(s) for the qualification(s).
Most construction jobs - for the reason that construction work is physical in nature.

28. Are there any jobs for which there are age, race, color, national origin, sex, creed, disability, marital status, sexual orientation, or citizenship qualifications? Yes___ No x

If yes, list the job(s), submit a job description and state the reason(s) for the qualification(s).



S & N BUILDERS, INC.

GENERAL CONTRACTOR

June 28, 2013

Construction Employment Report

Project: Bronx River Art Center Renovation - Borough of the Bronx

Project ID: PV467BRAC

Part II: Documents Required (explanation if policies are unwritten)

18.

- a. Management and other key employees are offered Health Benefit coverage with a premium sharing of 50%, with the employee having the discretion whether or not to avail.
- b. Our company does not offer any other Disability, Life or Other Insurance aside from what is required by law (Disability Benefits requirement).
- c. Our company does not maintain an employee policy/handbook.
- d. Our company does not maintain a personnel policy/manual.
- e. Our company does not maintain a supervisor's policy/manual.
- f. Our company does not offer any Pension plan or 401k coverage.
- g. Our firm has signed Collective Bargaining Agreements with Mason Tenders District Council (Local 79), PCC Local 1, and Roofers Local 8. Otherwise, when required, our firm signs a PLA.
- h. Our company does not have an employment application. In cases where we need more workforce, we call the Union for them to provide us with man power.
- i. Our company does not have any evaluation policy/form. Evaluation is non-written and is on a case to case basis.
- j. Our company compensates for 4 paid sick days. No other medical and/or non-medical leave policy.

156 East 3rd Street, Mt. Vernon, NY 10550

(914) 664-8444 (914) 664-8445 www.snbuilders.com



Robert W. Walsh
Commissioner

210CY288

January 5, 2011

Mr. Vieto Angelou Racho
S & N Builders, Inc.
107 Front Street
Hempstead, NY 11550

Re: **NYC Department of Design and Construction Contract (DDC); Project No. HWS2011M; Installation of sidewalks, adjacent curbs and pedestrian ramps as necessary in various locations; Borough of Manhattan; Contract Value: \$2,241,175.00; Certificate of Approval.**

Dear Mr. Racho:

The Department of Small Business Services/Division of Labor Services (DLS) has reviewed the Employment Report (ER) and supportive materials submitted by S & N Builders, Inc. located at 107 Front Street Hempstead, NY in connection with the contract referenced above.

DLS has concluded that S & N Builders, Inc. meets the equal employment opportunity requirements of the City of New York, as stated in Executive Order No. 50 (1980) as amended (E.O. 50), it's implementing Rules (Rules), and Chapter 56 of the City Charter (Chapter 56). Consequently, DLS has notified (DDC) of this determination.

Contingent upon S & N Builders, Inc.'s ongoing compliance with E.O. 50 and Chapter 56, this approval shall be effective for the one (1) year period commencing on January 5, 2011 and terminating January 4, 2012. **This determination for a one year approval only exempts contractors from completing the policy and procedure section of the Employment Report on future contracts within this one- year period.** However, S & N Builders, Inc.'s Construction Employment Report workforce information **must** be submitted for each new project as explained during the Pre-Award Conference on held on January 4, 2011.

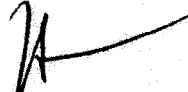
110 William Street, New York, NY 10038
Tel 212-513.6300 Fax 212.618.8879 www.nyc.gov/sbs

PAGE TWO
JANUARY 5, 2011

It is important that S & N Builders, Inc., as a New York City contractor provide equal employment opportunity for all employees and applicants for employment.

Please direct all correspondence to Ms. Rosalyn Dawson, Contract Reviewer. Should you have any questions regarding this letter, you may call Ms. Dawson at (212) 618-8843 or e-mail her at rdawson@sbs.nyc.gov.

Very truly yours,



Helen Wilson
Executive Director
Division of Labor Services

cc: Lorraine Holley (DDC)
Rosalyn Dawson
File

**BIDDER'S CERTIFICATION OF COMPLIANCE WITH
IRAN DIVESTMENT ACT**

Pursuant to General Municipal Law §103-g, which generally prohibits the City from entering into contracts with persons engaged in investment activities in the energy sector of Iran, the bidder/proposer submits the following certification:

[Please Check One]

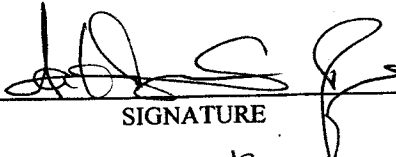
BIDDER'S CERTIFICATION

☒ By submission of this bid or proposal, each bidder/proposer and each person signing on behalf of any bidder/proposer 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, that each bidder/proposer is not on the list created pursuant to paragraph (b) of subdivision 3 of Section 165-a of the State Finance Law.

☐ I am unable to certify that my name and the name of the bidder/proposer does not appear on the list created pursuant to paragraph (b) of subdivision 3 of Section 165-a of the State Finance Law. I have attached a signed statement setting forth in detail why I cannot so certify.

Dated: Westchester, New York
6/4, 2013

ADNAN RAJA
NOTARY PUBLIC, State of New York
No. 01RA6134415
Qualified in Nassau County
Commission Expires October 03, 2013

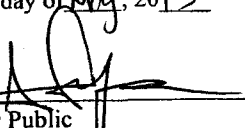


SIGNATURE
Sakander Raja

PRINTED NAME
President

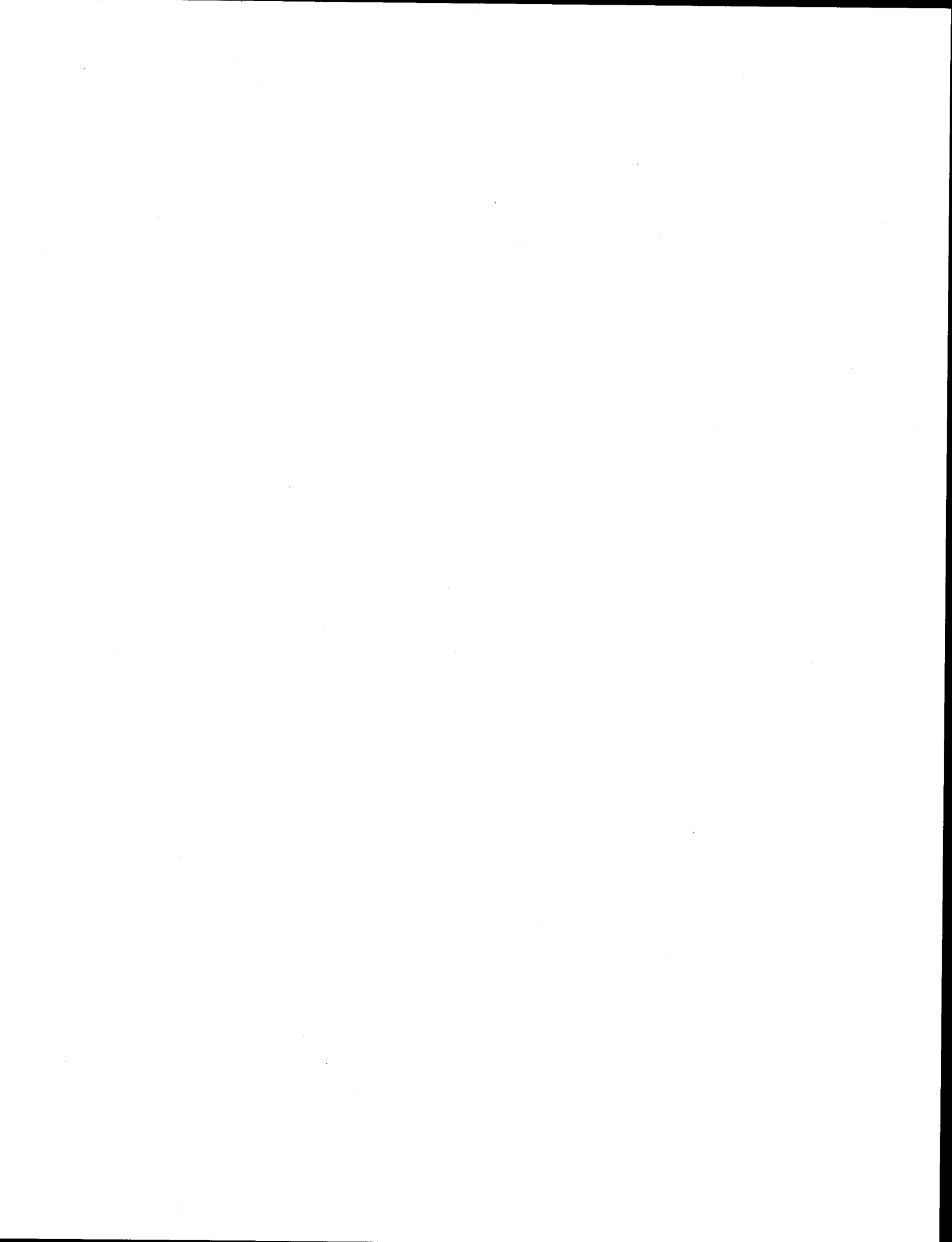
TITLE

Sworn to before me this
4 day of May, 2013



Notary Public

Dated: 6/4/2013



NYC AGENCY RENOVATION & REHAB CITY OWNED BUILDINGS/STRUCTURES

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 Bronx River Art Center and located at 1087 E. Tremont Avenue, Bronx, NY (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 and local trust agreements as set forth in the Project Labor Agreement and this Agreement 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.

Dated: 11/14/2013

Sakander Raja, President

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

S & N Builders, Inc.

(Name of Contractor or subcontractor)

[Signature]
(Authorized Officer & Title)

156 East 3rd Street

Mt. Vernon, NY 10550

(Address)

Tel. (914) 664-8444

Fax (914) 664-8445

(Phone) (Fax)

Contractor's State License

None

Sworn to before me this 2013
14 day of November, 2009

[Signature]
Notary Public

PUNNIYAKUMARI MUTHUVEL
NOTARY PUBLIC-STATE OF NEW YORK
No. 01MU6283472
Qualified in Queens County
My Commission Expires June 03, 2017

NEW YORK CITY BUILDING AND CONSTRUCTION TRADES COUNCIL

Prime Contractor Pre-Award Statement – Prevailing Wage Contracts

Agency: DEPARTMENT OF DESIGN AND CONSTRUCTION

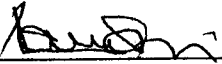
Prime Contractor: S & N Builders, Inc.

Contract #: PV467BRAC-R

On behalf of the prime contractor and contract shown above, I affirm that I have reviewed the following information with the contracting agency:

- The work to be done or the trades that will be employed on the contract;
- The Comptroller's prevailing wage schedules for each trade;
- The requirement to pay the prevailing wage and supplement rates in effect at the time the work is done, and the dates of likely changes in such rates (July 1 and January 1);
- The requirement for written agreements with all subcontractors, which include prevailing wage and supplement requirements;
- The registration, ratio and payment guidelines for apprentices, and whether their use is optional or required under this contract;
- The requirement to use City-approved certified payroll forms, and the need to fill those forms out completely;
- The requirement to use standard sign-in and sign-out logs or an agency-approved electronic or biometric system, and that such logs must be submitted to the resident engineer or agency representative daily;
- The requirement that all workers on job sites shall wear identification badges;
- The requirement to pay all workers by check weekly, and that for contracts over \$1,000,000 and subcontracts over \$750,000 such checks must be generated by either a payroll service or an agency-approved automated system; and
- That the prime contractor shall be liable to the City for the cost of enforcement in the event the prime contractor or any subcontractor is found in violation of these requirements.

I further affirm that the prime contractor will comply with these and all other relevant requirements of the New York State Labor Law and City of New York laws and regulations concerning payment of prevailing wages and supplements, and that violation of such laws may subject the prime contractor to various administrative, civil and criminal penalties.

Prime Contractor Signature:  Date: 11/13/2013

Printed Name: Sakander Raja

Position: President

Agency Witness: Christine Epinel Date: 11/13/2013

Printed Name: _____

Rev 3/08





NOTICE TO BIDDERS:

- **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 Contract for General Construction Work.

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.

SPECIAL NOTICE TO BIDDERS

The New York City Department of Small Business Services (SBS), in conjunction with the New York Business Development Corporation (NYBDC), have established a NYC Construction Loan pilot program to provide prime contractors and subcontractors financing for mobilization costs on certain City construction projects.

Under this initiative, loans are available for early stage mobilization needs such as insurance, labor, supplies and equipment. Bidders are strongly encouraged to visit “Growing Your Business” at www.nyc.gov/nycbusiness to learn more about the loan or contact constructionloan@sbs.nyc.gov / (212) 513-6444 to obtain details and to determine preliminary eligibility.

A successful loan applicant will be required to make an assignment of its contract (or subcontract) payments to the lender NYBDC until the loan is repaid. If the loan is to a subcontractor, a prime contractor must honor the terms of such an assignment.

A prime contractor may not discriminate against a subcontractor or potential subcontractor by reason of the subcontractor’s participation, or nonparticipation, in the NYC Construction Loan program.

**BID BOOKLET
PART A**

THIS PAGE INTENTIONALLY LEFT BLANK

CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF STRUCTURES

BID BOOKLET

TABLE OF CONTENTS

PART A	page
1. Special Notice to Bidders.....	2
2. MWBE Program Subcontractor Utilization Plan....	5
3. Bid Form.....	10
4. Affirmation.....	15
5. Bidder's Identification of Subcontractors.....	16
6. Bid Bond.....	18
7. Contractor's Bid Breakdown	21
8. Attachment 1 - Bid Information.....	22
 PART B	
9. Safety Questionnaire.....	23
10. Pre-award Process	26
11. Project Reference Form.....	28
12. Contract Certificate.....	31
13. Confirmation of Vendex Compliance.....	32
14. Iran Divestment Act Compliance Report.....	33
15. Construction Employment Report.....	35

**CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF STRUCTURES**

SPECIAL NOTICE TO BIDDERS

BID SUBMISSION REQUIREMENTS

**THE BID SHALL CONSIST OF TWO (2) SEPARATE, SEALED
ENVELOPES. THE DOCUMENTS THAT MUST BE COMPLETED AND
INCLUDED IN EACH SEPARATE ENVELOPE ARE LISTED BELOW.**

BID ENVELOPE #1: Bid Envelope #1 shall contain the following items:

- Bid Form, including Affirmation
- Bid Security (if required, see page 22)
- MWBE Subcontractor Utilization Plan (if participation goals have been established)

BID ENVELOPE #2: Bid Envelope #2 shall contain **ONLY** the following item:

- Bidder's Identification of Subcontractors (see pages 16 & 17)

**FAILURE TO SUBMIT THE FOUR ITEMS LISTED ABOVE
WILL RESULT IN THE DISQUALIFICATION OF THE BID**

BID ENVELOPE #1: In addition to the items listed above, Bid Envelope #1 shall also contain the following items: DO NOT Include the items listed below in Bid Envelope #2.

- Bid Breakdown (if required, see page 21)
- Safety Questionnaire
- Construction Employment Report (if bid is \$1,000,000 or more)
- Contract Certificate (if bid is less than \$1,000,000)
- Confirmation of Vendex Compliance
- Bidder's Certification of Compliance with Iran Divestment Act
- Special Experience Requirements Qualification Form (if required, see pages 3, 4)

**FAILURE TO SUBMIT THE SEVEN ITEMS LISTED ABOVE
MAY RESULT IN THE DISQUALIFICATION OF THE BID.**

- NOTES:**
- (1) All of the above referred to blank forms to be completed and submitted with the bid are included in the BID BOOKLET.
 - (2) If additional information is required, please contact DDC at 718-391-2601.
 - (3) **VENDEX QUESTIONNAIRES:** Vendex Questionnaires, as well as detailed instructions, may be obtained at www.nyc.gov/vendex. The bidder may also obtain Vendex forms and instructions by contacting the Agency Chief Contracting Officer or the contact person for this contract.
 - (4) **SPECIAL EXPERIENCE REQUIREMENTS:** The Bidder is advised that Special Experience Requirements may apply to this contract. Such requirements are set forth on pages 3 and 4 of this Bid Booklet.
 - (5) **SPECIAL EXPERIENCE REQUIREMENTS FOR ASBESTOS:** The Bidder is advised that this contract contains strict requirements regarding the prior experience and licensing of the subcontractor who will perform any required asbestos abatement work. These special experience requirements are set forth in the section of the specifications which describes any required asbestos abatement work.

SPECIAL EXPERIENCE REQUIREMENTS

Bidders are advised that the special experience requirements set forth below apply to each contract for which an "x" is indicated before the word "YES"

General Construction X YES NO

I. CONTRACT FOR GENERAL CONSTRUCTION WORK

- (A) **EXPERIENCE REQUIREMENTS FOR GENERAL CONSTRUCTION CONTRACTOR:** The special experience requirements set forth below apply to the bidder for the General Construction Contract. Compliance with such special experience requirements will be evaluated at the time of the bid.

- (1) The bidder must, within the last five (5) consecutive years prior to the bid opening, have successfully completed in a timely fashion at least three (3) projects similar in scope and type to the required work.
- (2) For each project submitted to meet the experience requirements set forth above, the bidder must complete and submit with its bid the Qualification Form set forth in this Bid Booklet. All information on the Qualification Form must be provided.

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

- (1) Special experience requirements apply to the specific areas of work set forth below.

- | | | |
|-----|-----------------|--------------------------------|
| (a) | Section 075400: | Thermoplastic Membrane Roofing |
| (b) | Section 085113: | Aluminum Windows |
| (c) | Section 095113: | Acoustic Panel Ceilings |
| (d) | Section 099646: | Intumescent Fireproofing |
| (e) | Section 230900: | HVAC Instr. & Controls |

- (2) Special experience requirements for the specific areas of work listed above are as follows:

- (a) The contractor or subcontractor performing the work of this section must, within the last five (5) consecutive years prior to the bid opening, have successfully completed in a timely fashion at least three (3) projects similar in scope and type to the required work.
- (3) For each project submitted to meet the experience requirements set forth above, the contractor or proposed subcontractor will be required to complete the Qualification Form included in this Bid Booklet.

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

(1) Special experience requirements apply to the manufacturer(s) set forth below.

- (a) Section 075400: Thermoplastic Membrane Roofing
- (b) Section 085113: Aluminum Windows
- (c) Section 095113: Acoustic Panel Ceilings
- (d) Section 099646: Intumescent Fireproofing
- (e) Section 230900: HVAC Instr. & Controls

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

- (a) The manufacturer providing the material or equipment specified in this section must, for the past five (5) years, have been regularly engaged in the manufacture of material or equipment similar in type to that required for this Project. Such similar material or equipment provided by the manufacturer must have been in satisfactory service for not less than five (5) years.

(D) **CONDITIONS:** The City may, in determining compliance with the special experience requirements set forth above, consider prior projects completed by principal(s) or other employees of the bidder while affiliated with another entity, subject to the conditions set forth below.

(1) Any principal or other employee on whose prior experience the bidder is relying to demonstrate compliance with this special experience requirement must have held the following: (a) a significant management role in the prior entity with which he/she was affiliated, and (b) a significant management role in the entity submitting the bid for a period of six months or from the inception of the bidding entity.

(2) The bidder may not rely on the experience of its principals or other employees to demonstrate compliance with any other requirements, including without limitation, financial requirements or requirements for a specified minimum amount of annual gross revenues.

(E) **JOINT VENTURES:** In the event the bidder is a joint venture, at least one firm in the joint venture must meet the above described experience requirements.

(F) **COMPLIANCE:** Compliance with the experience requirements set forth herein will be determined solely by the City. The bidder is advised that failure to meet the above described experience will result in the rejection of the bid as non-responsive.

Qualification Form

Project ID: PV467BRAC-R

List previous projects completed to meet the special experience requirements for this contract. Please photocopy this form for submission of all required projects.

Name of Contractor: _____

Name of Project: _____

Location of Project: _____

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

Name: _____

Title: _____ Phone Number: _____

Brief description of work completed: _____

Was the work performed as a prime or a subcontractor: _____

Amount of Contract: _____

Date of Completion: _____

Name of Contractor: _____

Name of Project: _____

Location of Project: _____

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

Name: _____

Title: _____ Phone Number: _____

Brief description of work completed: _____

Was the work performed as a prime or a subcontractor: _____

Amount of Contract: _____

Date of Completion: _____

THIS PAGE INTENTIONALLY LEFT BLANK

MWBE PROGRAM

SUBCONTRACTOR UTILIZATION PLAN

Schedule B: Subcontractor Utilization Plan: Schedule B: Subcontractor Utilization Plan for this Contract is set forth on the following pages of this Bid Booklet. Schedule B: Subcontractor Utilization Plan (Part I) indicates whether participation goals have been established for this Contract. If participation goals have been established for this Contract, the bidder must submit Schedule B: Subcontractor Utilization Plan (Part II) with its bid.

Contract Provisions: Contract provisions regarding the participation of the MWBE firms are set forth in Article 77 of the Contract. The bidder is advised to review these contract provisions.

Waiver: The bidder may seek a full or partial pre-award waiver of the Target Subcontracting Percentage in accordance with Article 77 of the Contract (See Part A, Section 10). The bidder's request for a waiver must be submitted at least seven (7) calendar days prior to the bid date. Waiver requests submitted after the deadline will not be considered. The form for requesting a waiver of the Target Subcontracting Percentage is set forth in Schedule B: Subcontractor Utilization Plan (Part III).

Rejection of the Bid: The bidder must complete Schedule B: Subcontractor Utilization Plan (Part II) set forth on the following pages. Subcontractor Utilization Plans which do not include the required affirmations (on Page 2) will be deemed to be non-responsive, unless a full waiver of the Target Subcontracting Percentage is granted (Schedule B: Subcontractor Utilization Plan, Part III). In the event that the City determines that the bidder has submitted a Schedule B: Subcontractor Utilization Plan where the required affirmations are completed but other aspects of the Plan are not complete, or contain a copy or computation error that is at odds with the affirmation, the bidder 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 plan to the Agency. Failure to do so will result in a determination that the Bid is non-responsive.

Receipt of notification is defined as the date notice is emailed or faxed (if the bidder has provided an email address or fax number), or no later than five (5) days from the date of mailing or upon delivery, if delivered.

Impact on LBE Requirements: If goals have been established for the participation of M/WBE's, the contractor is not required to comply with the Locally Based Enterprise Program ("LBE"). The LBE Program is set forth in Article 67 of the Contract.

THIS PAGE INTENTIONALLY LEFT BLANK

Tax ID #: _____

PIN#: 8502013PV0012C

Contract # 1 - General Construction Work

The City of New York

SCHEDULE B - Subcontractor Utilization Plan -Part I: Agency's Target

This page to be completed by contracting agency

Contract Overview

Pin # 8502013PV0012C FMS Project ID#: PV467BRAC-R

Project Title Bronx River Art Center Renovation

Contracting Agency Department of Design and Construction

Agency Address 30-30 Thomson Avenue City Long Island City State NY Zip Code 11101

Contact Person Norma Negron Title MWBE Liaison & Compliance Analyst

Telephone # (718) 391-1502 Email negronn@ddc.nyc.gov

Project Description (attach additional pages if necessary)

This Project consists of a gut renovation of the existing Bronx River Art Center at 1087 East Tremont Avenue in the Bronx. The scope includes decommissioning the cellar, which is susceptible to flooding, stabilizing and repointing the exterior masonry walls, upgrading the building to be NYC Department of Building Code and ADA compliant, replacing all windows and interior finishes, replacing the Mechanical, Electrical, and Plumbing systems, and introducing sprinkler, fire alarm and security systems.

(1) ✓ Target Subcontracting Percentage

Percentage of total contract dollar value that agency estimates will be awarded to subcontractors in amounts under \$1 million for construction and professional services.

30 %**Subcontractor Participation Goals**

Complete and enter total for each Construction or Professional Services, or both (if applicable).

Group	Construction	Professional Services
Black American	UNSPECIFIED %	%
Hispanic American	UNSPECIFIED %	%
Asian American	UNSPECIFIED %	No Goal
Caucasian Female	No Goal	%
Total Participation Goals	(2) 40 %	(3) %

* Note: For this procurement, individual ethnicity and gender goals are not specified. The Total Participation Goals for construction subcontracts may be met by using Black American, Hispanic American or Asian American firms or any combination of such firms.

THIS PAGE INTENTIONALLY LEFT BLANK

Tax ID #: _____

PIN#: _____

SCHEDULE B - Subcontractor Utilization Plan – Part II: Bidder/Proposer Subcontracting Plan

This page and the next (Part II herein) are to be completed by the bidder/proposer. **AFFIRMATIONS; Bidder/proposer must check the applicable boxes below, affirming compliance with M/WBE requirements.**

Bidder/proposer ☐ AFFIRMS or ☐ DOES NOT AFFIRM [statement below]

It is a material term of the contract to be awarded that, with respect to the total amount of the contract to be awarded, bidder/proposer will award one or more subcontracts for amounts under one million dollars, sufficient to meet or exceed the Target Subcontracting Percentage (as set forth in Part I) unless it obtains a full or partial waiver thereof, and it will award subcontracts sufficient to meet or exceed the Total Participation Goals (as set forth in Part I) unless such goals are modified by the Agency.

Bidder/proposer ☐ AFFIRMS that it intends to meet or exceed the Target Subcontracting Percentage (as set forth in Part 1); or
☐ AFFIRMS that it has obtained a full/partial pre-award waiver of the Target Subcontracting Percentage (as set forth in Part I) and intends to award the modified Target Subcontracting Percentage, if any; or
☐ DOES NOT AFFIRM

Section I: Prime Contractor Contact Information

Tax ID # _____ FMS Vendor ID # _____
 Business Name _____ Contact Person _____
 Address _____
 Telephone # _____ Email _____

Section II: General Contract Information**1. Define the industry in which work is to be performed.**

- **Construction** includes all contracts for the construction, rehabilitation, and/or renovation of physical structures. This category does include CM Build as well as other construction related services such as: demolition, asbestos and lead abatement, and painting services, carpentry services, carpet installation and removal, where related to new construction and not maintenance.
- **Professional Services** are a class of services that typically require the provider to have some specialized field or advanced degree. Services of this type include: legal, management consulting, information technology, accounting, auditing, actuarial, advertising, health services, pure construction management, environmental analysis, scientific testing, architecture and engineering, and traffic studies, and similar services.

a. Type of work on Prime Contract (Check one):**b. Type of work on Subcontract (Check all that apply):**

☐ Construction ☐ Professional Services ☐ Construction ☐ Professional Services ☐ Other

2. What is the expected percentage of the total contract dollar value that you expect to award to all subcontracts?

%

3. Will you award subcontract(s) in amounts below \$ 1 million for construction and/or professional services contracts within the first 12 months of the notice to proceed on the contract?

☐ Yes ☐ No

Section III: Subcontractor Utilization Summary

IMPORTANT: If you do not anticipate that you will subcontract at the target level the agency has specified, because you will perform more of the work yourself, you must seek a waiver of the Target Subcontracting Percentage by completing p. 9).

Step 1:	Subcontracts under \$1M (4) (construction/professional services)	Total Bid/Proposal Value	Calculated Target Subcontracting Percentage
Calculate the percentage (of your total bid) that will go towards subcontracts under \$1M for construction and/or professional services	<div style="border: 1px solid black; width: 150px; height: 30px; background-color: #cccccc;"></div>	<div style="border: 1px solid black; width: 150px; height: 30px; background-color: #cccccc;"></div>	
	\$	÷ \$	x 100 = %

- **Subcontracts under \$1M (construction/professional services):** Enter the value you expect to award to subcontractors in dollars for amounts under \$1 million for construction and/or professional services. This value defines the amount that participation goals apply to, and will be entered into the first line of Step 2.
- **Total Bid/Proposal Value:** Provide the dollar amount of the bid/proposal.
- **Calculated Target Subcontracting Percentage:** The percentage of the total contract dollar value that will be awarded to one or more subcontractors for amounts under \$1 million for construction and/or professional services. **This percentage must equal or exceed the percentage listed by the agency on page 1, at line (1).**

NOTE: The "Calculated Target Subcontracting Percentage" MUST equal or exceed the Target Subcontracting Percentage listed by the agency on Page 6, Line (1).

Tax ID #: _____

PIN#: _____

SCHEDULE B - cont.**Step 2:**

Calculate value of subcontractor participation goals

Subcontracts under \$1M
(construction/professional services)

- a. Copy value from Step 1, line (4) – the total value of all expected subcontracts under \$1M for construction and/or professional services

\$ _____

↓ ↓

- b. * From line a. above, allocate the dollar value of "Subcontracts under \$1M" by Construction and Professional Services,

* If all subcontracts under \$1M are in one industry, enter '0' for the industry with no subcontracts.

* Amounts listed on these lines should add up to the value from line a.

Construction**Professional Services****Subcontracts under \$1M by Industry**

\$ _____

\$ _____

* For Construction enter percentage from line (2) from Page 6.

* For Professional Services enter percentage from line (3) from Page 6.

- c. * **Total Participation Goals Percentages must be copied from Part I, lines (2) and (3).**

Total Participation Goals x _____ %

x _____ %

- d. **Value of Total Participation Goals**

\$ _____

\$ _____

Step 3:

- ☒ **Subcontracts in Amounts Under \$1 M Scope of Work – Construction**

Enter brief description of type(s) of subcontracts in amounts under \$1M anticipated, by type of work, not by name of subcontractor

- ☒ **Subcontracts in Amounts Under \$1 M Scope of Work – Professional Services**

Enter brief description of type(s) of subcontracts in amounts under \$1M anticipated, by type of work, not by name of subcontractor

Section IV: Vendor Certification and Required Affirmations

I hereby 1) acknowledge my understanding of the M/WBE requirements as set forth herein and the pertinent provisions of Local Law 129 of 2005, and the rules promulgated thereunder; 2) affirm that the information supplied in support of this subcontractor utilization plan is true and correct; 3) agree, if awarded this Contract, to comply with the M/WBE requirements of this Contract and the pertinent provisions of Local Law 129 of 2005, 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 subcontract(s) sufficient to meet the Target Subcontracting Percentage, unless a waiver is obtained, and the Vendor will award subcontract(s) sufficient to meet the Total Participation Goals unless such goals are modified by the Agency; and 5) agree and affirm, if awarded this contract the Vendor intends to make all reasonable, good faith efforts to meet the Target Subcontracting Percentage, or If the Vendor has obtained a waiver, the Vendor intends to meet the modified Target Subcontracting Percentage, if any, and the Vendor intends to solicit and obtain the participation of M/WBEs so as to meet the Total Participation Goals unless modified by the Agency.

Signature _____ Date _____
Print Name _____ Title _____

Tax ID #: _____

PIN#: _____

SCHEDULE B**PART III – REQUEST FOR WAIVER OF TARGET SUBCONTRACTING PERCENTAGE****Contract Overview**

Tax ID # _____ FMS Vendor ID # _____
 Business Name _____
 Contact Name _____ Telephone # _____ Email _____
 Type of Procurement ☐ Competitive Sealed Bids ☐ Other Bid/Response Due Date _____

PIN # (for this procurement) _____ Type of work on Prime Contract (Check one):
☐ Construction ☐ Construction ☐ Other
☐ Professional Services ☐ Professional Services

SUBCONTRACTING as described in bid/solicitation documents (Copy this % figure from Subcontractor Utilization Plan, Part I, line

_____ % of the total contract value anticipated by the agency to be subcontracted for construction/professional services subcontracts valued below \$1 million (each)

ACTUAL SUBCONTRACTING as anticipated by vendor seeking waiver

_____ % of the total contract value anticipated in good faith by the bidder/proposer to be subcontracted for construction/ professional services subcontracts valued below \$1 million (each)

Basis for Waiver Request: Check appropriate box & explain in detail below (attach additional pages if needed)

☐ Vendor does not subcontract construction/professional services, and has the capacity and good faith intention to perform all such work itself.

☐ Vendor subcontracts some of this type of work but at lower % than bid/solicitation describes, and has the capacity and good faith intention to do so on this contract.

☐ Other _____

References

List 3 most recent contracts/subcontracts performed for NYC agencies (if any)

CONTRACT NO.	AGENCY	DATE COMPLETED
_____	_____	_____
CONTRACT NO.	AGENCY	DATE COMPLETED
_____	_____	_____
CONTRACT NO.	AGENCY	DATE COMPLETED
_____	_____	_____

List 3 most recent contracts/subcontracts performed for other agencies/entities (complete ONLY if vendor has performed fewer than 3 NYC contracts)

TYPE OF WORK	AGENCY/ENTITY	DATE COMPLETED
Manager at agency/entity that hired vendor (Name/Phone No.)	_____	_____
TYPE OF WORK	AGENCY/ENTITY	DATE COMPLETED
Manager at agency/entity that hired vendor (Name/Phone No.)	_____	_____
TYPE OF WORK	AGENCY/ENTITY	DATE COMPLETED
Manager at agency/entity that hired vendor (Name/Phone No.)	_____	_____

VENDOR CERTIFICATION: I hereby affirm that the information supplied in support of this waiver request is true and correct, and that this request is made in good faith.

Signature: _____ Date: _____
 Print Name: _____ Title: _____

Shaded area below is for agency completion only

AGENCY CHIEF CONTACTING OFFICER APPROVAL

Signature: _____ Date: _____

CITY CHIEF PROCUREMENT OFFICER APPROVAL

Signature: _____ Date: _____

THIS PAGE INTENTIONALLY LEFT BLANK

BID FORM
THE CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF STRUCTURES

**BID FOR FURNISHING ALL LABOR AND
MATERIAL NECESSARY AND REQUIRED FOR:**

PROJECT ID: PV467BRAC-R

**Bronx River Art Center Renovation
1087 East Tremont Avenue
Bronx 10460**

Name of Bidder: _____

Date of Bid Opening: _____

Bidder is: (Check one, whichever applies) Individual () Partnership () Corporation ()

Place of Business of Bidder: _____

Bidder's Telephone Number: _____ Bidder's Fax Number: _____

Bidder's Email Address: _____

Residence of Bidder (If Individual): _____

If Bidder is a Partnership, fill in the following blanks:

Names of Partners

Residence of Partners

If Bidder is a Corporation, fill in the following blanks:

Organized under the laws of the State of _____

Name and Home Address of President: _____

Name and Home Address of Secretary: _____

Name and Home Address of Treasurer: _____

THIS PAGE INTENTIONALLY LEFT BLANK

BID FORM

The above-named 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 set forth on the Affirmation included as page 17 of this Bid Booklet.

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

5. 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).

6. 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.

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.

7. 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.

8. 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.

9. 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:

THIS PAGE INTENTIONALLY LEFT BLANK

Alternate Bids

Bidder is advised that the City is requesting the submission of three (3) alternate bids for **Contract #1 – General Construction Work** (Bid Alternate #1, Bid Alternate #2, and Bid Alternate #3). Each of these Bid Alternates addresses a different specific Scope of Work, as described below. Bid prices for these three (3) different Scopes of Work for General Construction Work shall be submitted on BID FORM - Bid Alternate 1, BID FORM - Bid Alternate 2, and BID FORM - Bid Alternate 3, in this Bid Booklet.

BID ALTERNATE #1: Requires a Total Lump Sum Price for all labor and material necessary to perform all required work described in the Contract Documents, **excluding** the scope of work for Bid Alternate #2 and Bid Alternate #3, as described below. Bid Alternate #1 is the Project Base Bid.

BID ALTERNATE #2: Requires a Total Lump Sum Price for the following: (1) all required work for Bid Alternate #1 (Project Base Bid), **plus** (2) all required work for the scope of Alternate #2 work. The scope of work for Alternate #2 is to provide an air conditioning system for Floors 1, 2 and 4 as described in the following Contract Documents:
Drawings: A201, A202, A204, P001, P101, P102, P103, P104, P105, P106, P107, P500, M100, M102, M103, M104, M105, M106, SP001, SP102, SP104, E102, E103, E105, E106.
Specifications: 238126, 238219 and specifications for associated work as described in Bid Booklet pages 21-40 through 21-44.

BID ALTERNATE #3: Requires a Total Lump Sum Price for the following: (1) all required work for Bid Alternate Bid #1 (Project Base Bid), **plus** (2) all required work for the scope of Alternate #2 work, **plus** (3) all required work for the scope of Alternate #3 work. The scope of work for Alternate #3 is to replace the windows as described in the following Contract Documents:
Drawings: A102, A103, A104, A105, A300, A301, A302, A303, A500, A501, A510, A530, A531, A532, A533.
Specifications: 085113 and specifications for associated work as described in Bid Booklet pages 21-45 through 21-46.

Bidders are requested to submit prices on the Bid Forms for alternate Bids described above. Following the receipt of Bids, the Department of Design and Construction will determine, in the best interest of the City, whether to award a contract based upon the Total Bid Price for **Bid Alternate #1, Bid Alternate #2, or Bid Alternate #3.**

BID FORM - BID ALTERNATE 1

PROJECT ID: PV467BRAC-R

TOTAL BID PRICE: In the space provided below, the Bidder shall indicate the total bid price in figures.

- A. **LUMP SUM PRICE** - Total price for all labor and material for all required work, excluding item (B) set forth below. Total Price shall include all costs and expenses, i.e. labor, material overhead and profit for all the Work, described and shown in the drawings and specifications.

Total Price For
Labor

Total Price for Material
Sold and Delivered

\$ _____ + \$ _____ Total Price for Item A \$ _____

- B. **ALLOWANCE** for Incidental Asbestos Abatement
(Section 028013 of the Specifications)

\$15,000.00

TOTAL BID PRICE (Add A + B)
(a/k/a BID PROPOSAL)

\$ _____

BIDDER'S SIGNATURE AND AFFIDAVIT

WARNING!! Failure to comply with items below will result in the rejection of your bid.

- * **SUBCONTRACTORS:** You **MUST** complete and submit the form entitled "Bidder's Identification of Subcontractors" (See Page 17) at the time you submit your bid. You must submit this form in a separate, sealed envelope (**BID ENVELOPE #2**). In the event an award of contract is not made to the Bidder, the Bidder hereby authorizes the Agency to shred the form entitled "Bidder's Identification of Subcontractors". _____ Yes
_____ No

- * **MWBE GOALS:** You **MUST** complete and submit the Affirmations contained in the Subcontractor Utilization Plan (See Page 7), or a pre-approved waiver (See Page 9), at the time you submit your bid. You must submit the Affirmations (or a pre-approved waiver) in **BID ENVELOPE #1**.

Bidder: _____

By: _____
(Signature of Partner or corporate officer)

Attest:
(Corporate Seal)

Secretary of Corporate Bidder

Affidavit on the following page should be subscribed
and sworn to before a Notary Public

THIS PAGE INTENTIONALLY LEFT BLANK

BID FORM - BID ALTERNATE 2

PROJECT ID: PV467BRAC-R

TOTAL BID PRICE: In the space provided below, the Bidder shall indicate the total bid price in figures.

- A. **LUMP SUM PRICE** - Total price for all labor and material for all required work, excluding item (B) set forth below. Total Price shall include all costs and expenses, i.e. labor, material overhead and profit for all the Work, described and shown in the drawings and specifications.

Total Price For
Labor

Total Price for Material
Sold and Delivered

\$ _____ + \$ _____ Total Price for Item A \$ _____

- B. **ALLOWANCE** for Incidental Asbestos Abatement
(Section 028013 of the Specifications)

\$15,000.00

TOTAL BID PRICE (Add A + B)
(a/k/a BID PROPOSAL)

\$ _____

BIDDER'S SIGNATURE AND AFFIDAVIT

WARNING!! Failure to comply with items below will result in the rejection of your bid.

- * **SUBCONTRACTORS:** You **MUST** complete and submit the form entitled "Bidder's Identification of Subcontractors" (See Page 17) at the time you submit your bid. You must submit this form in a separate, sealed envelope (**BID ENVELOPE #2**). In the event an award of contract is not made to the Bidder, the Bidder hereby authorizes the Agency to shred the form entitled "Bidder's Identification of Subcontractors". _____ Yes
_____ No

- * **MWBE GOALS:** You **MUST** complete and submit the Affirmations contained in the Subcontractor Utilization Plan (See Page 7), or a pre-approved waiver (See Page 9), at the time you submit your bid. You must submit the Affirmations (or a pre-approved waiver) in **BID ENVELOPE #1**.

Bidder: _____

By: _____
(Signature of Partner or corporate officer)

Attest:
(Corporate Seal)

Secretary of Corporate Bidder

Affidavit on the following page should be subscribed
and sworn to before a Notary Public

THIS PAGE INTENTIONALLY LEFT BLANK

BID FORM - BID ALTERNATE 3

PROJECT ID: PV467BRAC-R

TOTAL BID PRICE: In the space provided below, the Bidder shall indicate the total bid price in figures.

- A. **LUMP SUM PRICE** - Total price for all labor and material for all required work, excluding item (B) set forth below. Total Price shall include all costs and expenses, i.e. labor, material overhead and profit for all the Work, described and shown in the drawings and specifications.

Total Price For
Labor

Total Price for Material
Sold and Delivered

\$ _____ + \$ _____ Total Price for Item A \$ _____

- B. **ALLOWANCE** for Incidental Asbestos Abatement
(Section 028013 of the Specifications)

\$15,000.00

TOTAL BID PRICE (Add A + B)
(a/k/a BID PROPOSAL)

\$ _____

BIDDER'S SIGNATURE AND AFFIDAVIT

WARNING!! Failure to comply with items below will result in the rejection of your bid.

- * **SUBCONTRACTORS:** You **MUST** complete and submit the form entitled "Bidder's Identification of Subcontractors" (See Page 17) at the time you submit your bid. You must submit this form in a separate, sealed envelope (BID ENVELOPE #2). In the event an award of contract is not made to the Bidder, the Bidder hereby authorizes the Agency to shred the form entitled "Bidder's Identification of Subcontractors". _____ Yes
_____ No

- * **MWBE GOALS:** You **MUST** complete and submit the Affirmations contained in the Subcontractor Utilization Plan (See Page 7), or a pre-approved waiver (See Page 9), at the time you submit your bid. You must submit the Affirmations (or a pre-approved waiver) in BID ENVELOPE #1.

Bidder: _____

By: _____
(Signature of Partner or corporate officer)

Attest:
(Corporate Seal)

Secretary of Corporate Bidder

Affidavit on the following page should be subscribed
and sworn to before a Notary Public

THIS PAGE INTENTIONALLY LEFT BLANK

BID FORM (TO BE NOTARIZED)

AFFIDAVIT WHERE BIDDERS IS AN INDIVIDUAL

STATE OF NEW YORK, COUNTY OF _____ ss:

being duly sworn says:

I am the person described in and who executed the foregoing bid, and the several matters therein stated are in all respects true.

(Signature of the person who signed the Bid)

Subscribed and sworn to before me this
_____ day of _____,

Notary Public

AFFIDAVIT WHERE BIDDERS IS A PARTNERSHIP

STATE OF NEW YORK, COUNTY OF _____ ss:

being duly sworn says:

I am a member of _____ the firm described in and which executed the foregoing bid.
subscribed the name of the firm thereto on behalf of the firm, and the several matters therein stated are in all respects true.

(Signature of Partner who signed the Bid)

Subscribed and sworn to before me this
_____ day of _____,

Notary Public

AFFIDAVIT WHERE BIDDERS IS A CORPORATION

STATE OF NEW YORK, COUNTY OF _____ ss:

being duly sworn says:

I am the _____ of the above named corporation whose name is subscribed to and which executed
the foregoing bid. I reside at _____.
I have knowledge of the several matters therein stated, and they are in all respects true.

(Signature of Corporate Officer who signed the Bid)

Subscribed and sworn to before me this
_____ day of _____,

Notary Public

AFFIRMATION

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

(If none, the bidder shall insert the word "None" in the space provided above.)

Full Name of Bidder: _____

Address: _____

City: _____ State: _____ Zip Code: _____

CHECK ONE BOX AND INCLUDE APPROPRIATE NUMBER:

☐ A - Individual or Sole Proprietorship *
SOCIAL SECURITY NUMBER

☐ B - Partnership, Joint Venture or other unincorporated organization
EMPLOYER IDENTIFICATION NUMBER

☐ C - Corporation
EMPLOYER IDENTIFICATION NUMBER

By: _____
Signature: _____

Title: _____

If a corporation, place seal here

This affirmation must be signed by an officer or duly authorized representative.

* Under the Federal Privacy Act the furnishing of Social Security Numbers by bidders on City contracts is voluntary. Failure to provide a Social Security Number will not result in a bidder's disqualification. Social Security Numbers will be used to identify bidders, proposers or vendors to ensure their compliance with laws, to assist the City in enforcement of laws, as well as to provide the City a means of identifying of businesses which seek City contracts.

BID FORM (TO BE NOTARIZED)

AFFIDAVIT WHERE BIDDERS IS AN INDIVIDUAL

STATE OF NEW YORK, COUNTY OF _____ ss:

_____ being duly sworn says:

I am the person described in and who executed the foregoing bid, and the several matters therein stated are in all respects true.

(Signature of the person who signed the Bid)

Subscribed and sworn to before me this
_____ day of _____,

Notary Public

AFFIDAVIT WHERE BIDDERS IS A PARTNERSHIP

STATE OF NEW YORK, COUNTY OF _____ ss:

_____ being duly sworn says:

I am a member of _____ the firm described in and which executed the foregoing bid.
subscribed the name of the firm thereto on behalf of the firm, and the several matters therein stated are in all respects true.

(Signature of Partner who signed the Bid)

Subscribed and sworn to before me this
_____ day of _____,

Notary Public

AFFIDAVIT WHERE BIDDERS IS A CORPORATION

STATE OF NEW YORK, COUNTY OF _____ ss:

_____ being duly sworn says:

I am the _____ of the above named corporation whose name is subscribed to and which executed
the foregoing bid. I reside at _____.

I have knowledge of the several matters therein stated, and they are in all respects true.

(Signature of Corporate Officer who signed the Bid)

Subscribed and sworn to before me this
_____ day of _____,

Notary Public

AFFIRMATION

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

(If none, the bidder shall insert the word "None" in the space provided above.)

Full Name of Bidder: _____

Address: _____

City: _____ State: _____ Zip Code: _____

CHECK ONE BOX AND INCLUDE APPROPRIATE NUMBER:

☐ A - Individual or Sole Proprietorship *
SOCIAL SECURITY NUMBER

☐ B - Partnership, Joint Venture or other unincorporated organization
EMPLOYER IDENTIFICATION NUMBER

☐ C - Corporation
EMPLOYER IDENTIFICATION NUMBER

By: _____
Signature: _____

Title: _____

If a corporation, place seal here

This affirmation must be signed by an officer or duly authorized representative.

* Under the Federal Privacy Act the furnishing of Social Security Numbers by bidders on City contracts is voluntary. Failure to provide a Social Security Number will not result in a bidder's disqualification. Social Security Numbers will be used to identify bidders, proposers or vendors to ensure their compliance with laws, to assist the City in enforcement of laws, as well as to provide the City a means of identifying of businesses which seek City contracts.

BIDDER'S IDENTIFICATION OF SUBCONTRACTORS

NOTICE TO BIDDERS

SUBMISSION: The Bidder must, at the time of the bid, submit the form on the next page ("BIDDER'S IDENTIFICATION OF SUBCONTRACTORS"). This form must be submitted in a separate, sealed envelope (BID ENVELOPE #2). Failure to do so will result in the disqualification of the bid as non-responsive.

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

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

NOTE: This project may not involve all of the above listed subcontractors. Please see the form on the next page which indicates the subcontractors required for this Project.

The list of subcontractors is to be submitted in a separate sealed envelope by completing the form on the next page entitled "Bidder's Identification of Subcontractors". This form provides for the identification of any subcontractors intended to be used in any of the three trades listed above. If bidder intends to use its own forces for any of the above listed work, bidder should so indicate on the form.

Failure to submit the completed form on the next page ("Bidder's Identification of Subcontractors") that includes the names of subcontractors and the agreed upon amounts to be paid to such subcontractors will render the bid non-responsive.

PLEASE NOTE: for any contract that is subject to M/WBE participation goals under Local Law 129, if the bidder's intention to use its own forces to do any of the above-referenced work would result in Bidder's failure to attain the Target Subcontracting Percentage identified in the Subcontractor Utilization Plan, the bid will be non-responsive unless the bidder requests and obtains a Waiver of Target Subcontracting Percentage (Subcontractor Utilization Plan, Part III) in advance of bid submission.

After the low bid is announced, the sealed list submitted by the low bidder will be opened and the names of the subcontractors will be announced. The sealed lists of subcontractors submitted by all other bidders shall be maintained by the Agency unopened unless such bidder shall become the low bidder (e.g., the initial low bidder is found non-responsive). All unopened lists of subcontractors shall be returned to the bidders unopened after contract award, unless the bidder has given the agency permission to shred the form.

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

BIDDER'S IDENTIFICATION OF SUBCONTRACTORS

Project ID: PV467BRAC-R

SUBMISSION: In addition to its Bid (Bid Envelope # 1), the Bidder must, at the time of the bid, complete and submit this form in a separate, sealed envelope (Bid Envelope # 2). To complete this form, the Bidder must identify the subcontractors it intends to use for the work listed below, as well as the dollar amount to be paid to each subcontractor. Failure to complete this form and submit it in a separate, sealed envelope will result in the disqualification of the bid as non-responsive.

The Bidder intends to use the following subcontractors. If the Bidder intends to do any of the work referenced below with its own forces, the Bidder should complete this form using its own name. If multiple subcontractors for any trade are proposed, Bidder may submit multiple copies of this form.

1. PLUMBING CONTRACTOR:

(Print Name)

Agreed Amount To Be Paid To Subcontractor: \$ _____

2. HVAC CONTRACTOR:

(Print Name)

Agreed Amount To Be Paid To Subcontractor: \$ _____

3. ELECTRICAL CONTRACTOR:

(Print Name)

Agreed Amount To Be Paid To Subcontractor: \$ _____

BIDDER'S SIGNATURE: The Bidder must sign this form in the space provided below:

Name of Bidder: _____

By: _____
Signature of Partner or Corporate Officer

Print Name: _____

Title: _____

BID BOND 1
FORM OF BID BOND

KNOW ALL MEN BY THESE PRESENTS. That we, _____

hereinafter referred to as the "Principal", and _____

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 _____

(\$ _____), 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 _____

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.

BID BOND 2

In the event that the Proposal of the Principal shall be accepted and the Contract be awarded to him 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 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 _____ day of _____, _____.

(Seal)

Principal (L.S.)

By: _____

(Seal)

Surety

By: _____

BID BOND 3

ACKNOWLEDGEMENT OF PRINCIPAL, IF A CORPORATION

State of _____ County of _____ ss:
On this _____ day of _____, _____, before me personally came
_____ to me known, who, being by me duly sworn, did depose and say that he
resides at _____
that he is the _____ 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.

Notary Public

ACKNOWLEDGEMENT 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

ACKNOWLEDGEMENT 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

AFFIX ACKNOWLEDGEMENTS AND JUSTIFICATION OF SURETIES

THIS PAGE INTENTIONALLY LEFT BLANK

BID BREAKDOWN

Submission: Bidders are advised that the requirement to submit a Bid Breakdown applies to each contract for which an "X" is indicated before the word "Yes". If required, the bidder must submit, with its bid, a completed Bid Breakdown. Failure to provide a completed Bid Breakdown may result in rejection of the bid as non-responsive.

 X YES NO

Limitations on Use of Bid Breakdown:

Bidders are advised that the Bid Breakdown shall be used for bid analysis purposes only and shall not be binding for any other purposes under the Contract, including, without limitation, for payment purposes or in connection with a contractor claim for extra work. If the form for the Bid Breakdown does not include an item of work required by the Contract Documents, such omission shall have no effect whatsoever, nor shall it be used by the contractor in connection with a claim for extra work (i.e., work for which the contractor is entitled to a change order).

Instructions for Preparing Bid Breakdown:

- (A) The Bid Breakdown is set forth on the following pages of this Bid Booklet and is in accordance with the Construction Specification Institute (CSI) format. For all items of work listed in the Bid Breakdown, the bidder must indicate the price for labor and the price for material, as well as the estimated quantities required.
- (B) In preparing its Bid Breakdown, the bidder shall submit prices that include all costs for overhead and profit. Overhead shall include, without limitation, all costs in connection with the following: administration, management, superintendence, small tools, insurance, bonds, and provision of services or items required by the General Conditions [except for Security/Fire Guard Services and Temporary Heat]. If the Project requires Security/Fire Guard Services and/or Temporary Heat, such service(s) will be included as separate line items in the Bid Breakdown.
- (C) If an item is set forth in the Bid Breakdown, but is not included in the Contract Documents (Drawings, Specifications, General Conditions, and/or Addenda), the bidder is advised to leave the item blank and exclude the cost of the item from its grand total. In an attachment to its Bid Breakdown, the bidder shall provide a list of all items left blank.
- (D) If an item is not set forth in the Bid Breakdown, but is included in the Contract Documents (Drawings, Specifications, General Conditions, and/or Addenda), the bidder is advised to add the item to its Bid Breakdown and include the cost of the item in its grand total. In an attachment to its Bid Breakdown, the bidder shall provide a list of all items added.

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation

Location: 1087 East Tremont Avenue, Bronx NY 10460

Bidder:

DDC ID#: PV467BRAC-R

AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
CONTRACT 1 - GENERAL CONSTRUCTION BID ALTERNATE 1								
010000	GENERAL REQUIREMENTS							
	Mobilization		LS					
	Temporary Heat		LS					
	Fire Guards		LS					
	Security Guards		LS					
	subtotal							
017419	<u>Construction Waste Management & Disposal</u>	Included W/ General Conditions						
018000	<u>Commissioning</u>		LS					
	subtotal							
018100	<u>Demonstration and Training</u>	Included W/ General Conditions						
018113	<u>Sustainable Design Requirements (LEED Building)</u>							
	<u>Lead Administration & Compliance</u>		LS					
	subtotal							
018113.3	<u>Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints & Coatings</u>	Included W/ Material Costs						
018119	<u>Construction IAQ Requirements</u>							
	<u>IAQ Requirement</u>		LS					
	subtotal							
018200	<u>Operation & Maintenance Data</u>	Included W/ General Conditions						

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation

Location: 1087 East Tremont Avenue, Bronx NY 10460

Bidder:

DDC ID#: PV467BRAC-R

AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
020000	EXISTING CONDITIONS							
024119	Selective Demolition							
	Remove 1st Floor Framing (Salvage Joists)		SF					
	Remove Conc. Stair @ Areaway		RFT					
	Remove Interior Partitions		SF					
	Remove Doors & Frames							
	- Single		EA					
	- Double		Pairs					
	Remove Hatch & Surrounding Sidewalk		LS					
	Remove OH Door		EA					
	Remove Storefront		SF					
	Sawcut, Shore & Remove Exterior Masonry Wall For New Openings		SF					
	Remove Stairs & Railings		Flight					
	Remove Subflooring		SF					
	Cut Openings In Exist. Floor Framing For New Openings		SF					
	Floor Drain Trenches on 1st Floor (8" x 6") as per 2-S402		LF					
	Remove Interior Windows		EA					
	Remove Roofing		SF					
	Remove Ladder		EA					
	Grind Down Sloping Conc. Floor		SF					
	Remove Subflooring/ Roof Deck For Mechanical Penetrations		LOC					
	Remove Terracotta Copings		LF					
	Cap Exist. Chimney Cap		EA					
	Temp. Construction Barricades		SF					
	Protect Existing Stairs To Remain		Flights					
	Temp. Protection @ Roof		SF					
	Misc. Demolition		LS					

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation

Location: 1087 East Tremont Avenue, Bronx NY 10460

Bidder:

DDC ID#: PV467BRAC-R

AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
	Remove, Salvage, Store & Protect Furniture & Equipment							
	- Desks		EA					
	- Trunk		EA					
	- Photo Exposing Unit		EA					
	- Painting Rack		EA					
	- Double Sinks		EA					
	subtotal							
026500	Removal of Underground Storage Tank		EA					
	subtotal							
028213	Asbestos Abatement							
	Hazmat Abatement		SF					
	subtotal							
030000	CONCRETE							
033000	Cast In Place Concrete							
	Elevator Pit Slab W/ #5 @ 12" o/c, T & B, EW		CY					
	Elevator Pit Walls W/ #5 @ 12" o/c, T & B, EW		CY					
	Sump Pit @ Elevator Pit		EA					
	6" Reinforced Concrete Slab On Grade @ 1st Floor		SF					
	Patch Conc. Slab @ Conc. Slab On Grade @ 1st Floor		SF					
	Cont. Conc. Footing W/ (2) #5 Cont. @ Paved Walk		CY					
	Retaining Wall Concrete		CY					
	2 1/2" Reinforced Lightweight Conc. - Roof at & Outside Boiler Rm		SF					
	Concrete Footings		EA					
	Architectural Concrete							

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

DDC ID#: PV467BRAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
	2" Finished Conc. Surface		SF					
	Lean Concrete Curbing @ Paved Walk		LF					
	Conc. Wall W/ #4 & 5 @ 12" O/C		CY					
	subtotal							
035216	Geofill Low Density Cellular Concrete							
	Fill Cellar w/Lightweight Flowable Fill		CY					
	subtotal							
040000	MASONRY							
042000	Unit Masonry							
	Masonry Infill							
	- 8" Reinforced CMU		SF					
	- (2) 8" Reinforced CMU		SF					
	- 8" Reinforced CMU & Brick Veneer 1 Side		SF					
	- (2) 8" Reinforced CMU & Brick Veneer 1 Side		SF					
	2" Concrete Pavers Under 4th Floor Kiln		SF					
	Splash Stones @ Bulkhead Leaders		EA					
	subtotal							
049000	Masonry Restoration & Cleaning							
	Facade Restoration							
	- Scaffold		SF					
	- Repair, Repoint & Clean Façade - ALLOW		SF					
	- Remove Exist Exposed Steel & Patch Masonry		LOC					
	- Masonry Crack Repair		LF					
	Interior Face Of Exterior Wall To Be Repointed After Removal Of Plaster (appx 25% of Wall)		SF					

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation

Location: 1087 East Tremont Avenue, Bronx NY 10460

Bidder:

DDC ID#: PV467BRAC-R

AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
	Parge Inside Face Of Masonry Parapets		SF					
	Sawcut & Install New Vertical Expansion Joints in Brick Facade		LF					
	New Beam Pockets Associated with New Floor Framing		EA					
	subtotal							
050000	METALS							
051200	Structural Steel							
	Structural Steel Beams, Columns, WT's & Column Reinforcing (Existing Structure Reinforcing & New Penetration Framing)		LBS					
	Structural Steel Roof Beams		LBS					
	Structural Steel for Concrete Pad at Roof Boiler Room Area		LBS					
	Furnish & Install Steel Lintels							
	- (2) C10 x 20		LF					
	- (2) C6 x 8.2		LF					
	- HSS 12 x 8 x 1/4"		LF					
	- HSS 8 x 8 x 1/4" Columns		LF					
	subtotal							
053100	Steel Deck							
	1 1/2" 18 Ga. Roof Deck		SF					
	3" 18 Ga. Roof Deck at Boiler Room Area		SF					
	subtotal							
054000	Cold Formed Metal Framing							
	14J12 Metal Roof Joist		LF					
	L6 x 4 x 5/16 Bolted @ 24" O/C To Support Joist		LF					
	14J14 @ Bulkhead Roof		LF					

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

DDC ID#: PV467BRAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
	Bulkhead Wall Framing		SF					
	12SW14 Joist Column 3 to 4		LF					
	12JE12 Joist @ Kiln Room		LF					
	subtotal							
055000	Miscellaneous Metals							
	Vertical Steel Ladders		LF					
	Steel Pipe Rails @ Stairs		LF					
	2" Ptd. Stl. Roof Rail @ Parapet		LF					
	Painted Steel Pipe Rail		LF					
	Safety Nosing For Concrete Steps		LF					
	Misc. Metals		LS					
	subtotal							
055100	Steel Pan Stairs		W/Others					
060000	WOODS & PLASTICS							
061000	Rough Carpentry							
	Infill Floor Framing (6SW18) @ 2nd Floor		SF					
	Infill Floor Framing (6SW18) @ Bulkhead		SF					
	Pack Out Steel For FJ Connections		LF					
	Replace Damaged Floor Joist - Allow 10%		LF					
	Add Floor Joists for Floor Levelling - 80%		LF					
	PT Wood Blocking @ Roof Copings		LF					
	PT Wood Blocking @ Roof HVAC Units		LF					
	Misc. Rough Blocking		LS					
	subtotal							

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation

Location: 1087 East Tremont Avenue, Bronx NY 10460

Bidder:

DDC ID#: PV467BRAC-R

AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
061600	Sheathing							
	Plywood Subfloor @ Floors 2 thru 4		SF					
	Remove & Patch Damaged Roof Decking (Allow for 25% Replacement)		SF					
	subtotal							
070000	THERMAL MOISTURE PROTECTION							
071900	Waterproofing							
	Elevator/ Sump/ Ejector Pit Waterproofing		SF					
	Fluid Applied WP W/ 1/2" Protection Board		SF					
	subtotal							
071200	Building Insulation							
	6" Sound Batts @ 1st & 2nd Floor Ceilings		SF					
	6" Sound Batts @ Exterior Perimeter Within Ceiling		SF					
	6" Tapered Insulation @ Roof		SF					
	subtotal							
072150	Closed Cell Spray Insulation							
	Closed Cell Spray Insulation		SF					
	subtotal							
072400	Exterior Insulation & Finish System (EIFS)							
	EIFS @ Roof Boiler Rm, Bulkheads & Elevator (w/ 2" Rigid Insulation)		SF					
	subtotal							

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation

Location: 1087 East Tremont Avenue, Bronx NY 10460

Bidder:

DDC ID#: PV467BRAC-R

AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
072700	Vapor Barriers							
	Liquid Applied Vapor Barrier For Roof		/ Roofing					
	Vapor Barrier Below Wood Floor		/ Flooring					
075400	Thermoplastic Membrane Roofing							
	Roofing System							
	- Thermoplastic Roofing Membrane (On 6" Rigid Insul.)		SF					
	- 6" Tapered Insulation @ Roof		SF					
	- Liquid Applied Vapor Barrier For Roof		SF					
	2' x 2' Concrete Pavers On Pedestals for Rooftop Landings		SF					
	Walking Pads on Roof in Lieu of Concrete Pavers		SF					
	subtotal							
076200	Sheet Metal Flashing							
	Alum. Sill Flashing @ Window Sills		LF					
	St. Stl. Base Flashing & Counterflashing @ Bulkheads & Parapets		LF					
	12" St. Stl. Flashing @ East Side Foundation Wall		LF					
	St. Stl. Flashing & Protection Board @ New 6" SOG		LF					
	Through Wall Flashing							
	Alum. Coping @ Parapets		LF					
	Alum Gravel Stop @ Bulkheads		LF					
	subtotal							
076500	Flexible Flashings							
	Waterproof Membrane On Bulkhead Walls & Parapets		SF					
	subtotal							

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

DDC ID#: PV467BRAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
077200	<u>Roof Specialties & Accessories</u>							
	Alum. Gutter		LF					
	Alum Downspouts		LF					
	Scupper (1-A543)		LOC					
	subtotal							
078400	<u>Firestops & Smoke seals</u>							
	Firestopping		LS					
	subtotal							
079200	<u>Joint Sealants</u>							
	Backer Rod & Sealant @ Exterior Openings		LF					
	Comp. Fill W/ Backer Rod & Sealant @ 6" SOG		LF					
	Interior Caulking & Sealants		LS					
	subtotal							
080000	<u>DOORS & WINDOWS</u>							
081113	<u>Hollow Metal Doors & Frames</u>							
	- 6'-0"x 7'-0" Type A, 1 1/2hr Fire Rated		PAIRS					
	- 6'-0"x 7'-0" Type A, 1 1/2hr Fire Rated w/ 1' 4" x 6" Glass View Panels		PAIRS					
	- 6'-0"x 7'-0" Type A, Non Rated		PAIRS					
	- 3'-0"x 7'-0" Type B, 1 1/2hr Fire Rated		EA					
	- 3'-0"x 7'-0" Type B, Non Rated		EA					
	- 3'-0"x 7'-0" Type B, 1 1/2hr Fire Rated (Exterior)		EA					

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

DDC ID#: PV467BRAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
081416	- 3'-0"x 7'-0" Type A, 2hr Fire Rated (Exterior)		EA					
	- 4'-6"x 7'-0" Type A, 1 1/2hr Fire Rated		PAIR					
	- 4'-0"x 7'-0" Type B, Non Rated		EA					
	- 2'-6"x 7'-0" Type B, 1 1/2hr Fire Rated		EA					
	- 1'-0"x 2'-0" Type G, Non Rated (room 104)		EA					
	subtotal							
081416	Flush Wood Doors							
	Sliding Wood Doors & Frames							
	- 6'-0"x 7'-0" Type D, Non Rated		PAIRS					
	- 4'-0"x 8'-0" Type C, Non Rated		PAIRS					
	- 3'-0"x 7'-0" Type C, Non Rated		EA					
	Pocket Doors & Frames							
	- 2'-1 1/2"x 7'-0" Type E, Non Rated		EA					
	Barn Doors & Frames							
	- 3'-6"x7'-2" Type H, Non Rated		EA					
	- 4'-11 1/4"x7'-1/2" Type H, Non Rated		EA					
083113	- 3'-2"x3'-7" Type H, Non Rated		EA					
	subtotal							
	Access Doors							
083326	Access Doors		LS					
	subtotal							
	Overhead Coiling Doors							
083326	Roll Down Security Shutters		SF					
	subtotal							

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

DDC ID#: PV467BRAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
083510	Folding Door 11'-2" x 9'-8" Alum. & Glass Bifold Garage Door		EA					
	subtotal							
084113	Aluminum Entrances & Storefronts							
	Exterior Storefronts							
	- Exterior Storefront		SF					
	subtotal							
085113	Aluminum Windows & Doors							
	Exterior Storefronts							
	- 6'-0" x 7'-0" Alum/Glass Doors, Frames & Hardware W/ Transom Above		PAIRS					
	Interior Storefronts							
	6'-0" x 7'-0" Alum/Glass Doors, Frames & Hardware W/ (2) Sidelights		PAIRS					
	subtotal							
087100	Door Hardware		LS					
	subtotal							
088000	Glass & Glazing	INCLUDED ABOVE						
089000	Louvers & Vents							
	Louvers		SF					
	subtotal							

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

DDC ID#: PV467BRAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
090000	FINISHES							
090160.91	Flooring Restoration							
	Patch Existing Terrazzo Flooring @ Ex. Stairs & Landings - (see A700 note)		SF					
	subtotal							
092400	Portland Cement Plastering	Included Below						
092500	Gypsum Drywall (Walls)							
	1 5/8" Mtl. Stud W/ 1 Layer 5/8" GWB One Side W/ (Taped & Spackled)		SF					
	2 1/2" Mtl. Stud W/ 1 Layer 5/8" GWB One Side (Taped & Spackled)		SF					
	6" Mtl. Stud W/ 1 Layer 5/8" GWB One Side (Taped & Spackled)		SF					
	6" Mtl. Stud W/ 1 Layer 5/8" MR GWB One Side (Taped & Spackled)		SF					
	1 5/8" Mtl. Stud W/ 1 Layer 5/8" MR GWB One Side W/ Permeable & Non-Permeable Vapor Barriers (Taped & Spackled)		SF					
	2 1/2" Mtl. Stud W/ 1 Layer 5/8" MR GWB One Side (Taped & Spackled)		SF					
	6" Mtl. Stud W/ 1 Layer 5/8" MR GWB One Side (Taped & Spackled)		SF					
092500	2 1/2" Mtl. Stud W/ 1 Layer 5/8" GWB Both Sides & Sound Attenuation Blanket (Taped & Spackled)		SF					
	2 1/2" Mtl. Stud W/ 1 Layer 5/8" GWB 1 Side W/ 1 Add. Layer Of MRGB Other Side & Sound Attenuation Blanket (Taped & Spackled)		SF					
	3 5/8" Mtl. Stud W/ 1 Layer 5/8" GWB Both Sides & Sound Attenuation Blanket (Taped & Spackled)		SF					
	3 5/8" Mtl. Stud W/ 1 Layer 5/8" MRGB Both Sides & Sound Attenuation Blanket (Taped & Spackled)		SF					
	6" Mtl. Stud W/ 1 Layer 5/8" GWB Both Sides & Sound Attenuation Blanket (Taped & Spackled)		SF					

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

DDC ID#: PV4678RAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
	6" Mtl. Stud W/ 1 Layer 5/8" GWB 1 Side W/ 1 Add. Layer Of MRGB Other Side & Sound Attenuation Blanket (Taped & Spackled)		SF					
	2 1/2" Mtl. Stud W/ 1 Layer 5/8" MRGB Both Sides W/ Additional 5/8" GWB on 3/4" Plywood Grounds on 1 Side & Sound Attenuation Blanket (Taped & Spackled)		SF					
	6" Mtl. Stud W/ 1 Layer 5/8" MRGB Both Sides W/ Additional 5/8" GWB on 3/4" Plywood Grounds on 1 Side & Sound Attenuation Blanket (Taped & Spackled)		SF					
	2 1/2" Mtl. Stud W/ 2 Layer 5/8" GWB Both Sides & Sound Attenuation Blanket (Taped & Spackled)		SF					
	2 1/2" Mtl. Stud W/ 2 Layers 5/8" GWB One Side & 1 Layer 5/8" GWB w/ Additional Layer of 5/8" MRGB on Second Side & Sound Attenuation Blanket (Taped & Spackled)		SF					
	3 5/8" Mtl. Stud W/ 2 Layers 5/8" GWB Both Sides & Sound Attenuation Blanket (Taped & Spackled)		SF					
	3 5/8" Mtl. Stud W/ 2 Layers 5/8" GWB One Side & 1 Layer 5/8" GWB w/ Additional Layer of 5/8" MRGB on Second Side & Sound Attenuation Blanket (Taped & Spackled)		SF					
092500	2 1/2" Mtl. Stud W/ 2 Layer 5/8" MRGB Both Sides W/ Add. Layer Of Plywood Ground, & 1 Layer 5/8 GWB & Sound Attenuation Blanket (Taped & Spackled)		SF					
	6" Mtl. Stud W/ 2 Layer 5/8" MRGB Both Sides W/ Add. Layer Of Plywood Ground, & 1 Layer 5/8 GWB & Sound Attenuation Blanket (Taped & Spackled)		SF					
	3 5/8" Mtl. Stud W/ 1 Layer 5/8" GWB Both Sides & 1 Layer 3/4" Plywood Each Side (Taped & Spackled)		SF					
	(2) 2 1/2" Mtl. Stud W/ 1 Layer 5/8" GWB Each Side (4 total) & 2 Sound Attenuation Blankets - Pocket Door Framing (Taped & Spackled)		SF					

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation

Location: 1087 East Tremont Avenue, Bronx NY 10460

Bidder:

DDC ID#: PV467BRAC-R

AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
	(2) 2 1/2" Mtl. Stud W/ 1 Layer 5/8" GWB Each Side W/ 1 GWB MR Rated (4 total) & 2 Sound Attenuation Blankets - Pocket Door Framing (Taped & Spackled)		SF					
	2 1/2" Mtl. Stud W/ 1 Layer 5/8" GWB Both Sides & Sound Attenuation Blanket (Taped & Spackled)		SF					
	6" Mtl. Stud W/ 1 Layer 5/8" GWB Both Sides & Sound Attenuation Blanket (Taped & Spackled)		SF					
	3 5/8" Mtl. Stud W/ 2 Layers 5/8" GWB Both Sides W/ Additional 2 1/2" Mtl. Stud W/ 1 Layer of 5/8" GWB & 2 Sound Attenuation Blankets (Taped & Spackled)		SF					
	2 1/2" Mtl. Stud W/ 2 Layers 5/8" GWB Both Sides W/ Additional 1 5/8" Mtl. Stud W/ 1 Layer of 5/8" GWB on 1 Side & Plywood Ground W/ 5/8" GWB on 2nd Side & Sound Attenuation Blanket - Pocket Door Framing (Taped & Spackled)		SF					
	6" Mtl. Frame W/ 2 Layer 5/8" GWB Both Sides (Taped & Spackled) - Boiler Rm		SF					
	2 Layers 5/8" Gyp. Board On Furring Channels (Column Enclosure)		SF					
	Type 5 Partition		SF					
	Gypsum Drywall (Ceilings)							
	5/8" GWB (On New L.G. Mtl. Joist) - Taped & Spackled		SF					
	GWB @ Underside Of New Stairs & Landings - Taped & Spackled		SF					
	GWB Ceiling Coves - Taped & Spackled		LF					
	GWB Fascias - Taped & Spackled		SF					
	Gyp. Board Stl. Beam Enclosures		SF					
	subtotal							
093100	Stone & Tile							

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

DDC ID#: PV467BRAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
	Resinous Floor Coating System (Dextotex)		SF					
	Ceramic Tile Wainscott		SF					
	Ceramic Tile Backsplash @ Pantries & Workshop		SF					
	Dextotex in lieu of Porcelain Floor Tile		SF					
	subtotal							
095113	Acoustical Panel Ceiling		SF					
	ACT							
	subtotal							
096519	Resilient Tile Flooring							
	Rubber Base - 4"		LF					
	subtotal							
099000	Painting & Finishing							
	Paint GWB Walls		SF					
	Paint Masonry Walls		SF					
	Paint Doors & Frames							
	- HM Doors & Frames		LVS					
	- WD Doors & Frames		LVS					
	Paint GWB Ceilings/Fascias/Coves		SF					
	Paint Plywood Subfloor		SF					
	Paint Plywood Base		LF					
	Paint Cased Opening		LF					
	Paint Hardwood Sills		LF					
	Paint Cap @ Half Wall		LF					

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation

Location: 1087 East Tremont Avenue, Bronx NY 10460

Bidder:

DDC ID#: PV467BRAC-R

AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
	Sealed Conc. Flooring	Included W/ Conc.						
	Epoxy WP Sealer On New Stair Treads & Landings		SF					
	Epoxy WP Sealer On New Boiler Room Floor		SF					
	Paint Exposed Ductwork		SF					
	Lintels		LF					
	subtotal							
099200	Breathable Masonry Coating	Included W/ Painting.						
099646	Intumescent Fireproofing							
	Spray On Fireproofing (On All Structural Steel)		SF					
	subtotal							
100000	SPECIALTIES							
102113	Floor Mounted Toilet Partitions		EA					
	Toilet Partitions		EA					
	Toilet Partitions - ADA Compliant							
	subtotal							
102800	Toilet & Utility Accessories							
	Paper Towel Disp.		EA					
	Toilet Paper Holder		EA					
	18" x 36" Stl. Mirror		EA					
	Lav. Mounted Soap Disp.		EA					
	36" Stl. Grab Bar		EA					
	42" Stl. Grab Bar		EA					
	subtotal							

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

DDC ID#: PV467BRAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
104000	<u>Signage</u>							
	Interior Signage		LS					
	Exterior St Stl. Signage Letters		EA					
	Restore & Reinstall Exist. BRAC Signage Letters		EA					
	Painted Graphics (On Masonry)		LS					
	subtotal							
105113	<u>Fire Extinguishers and Cabinets</u>							
	Flammable Liquids Cabinets		EA					
	subtotal							
120000	<u>FURNISHINGS</u>							
064000	Cabinetry & Millwork							
	Cased Opening @ Service Window		LF					
	1 1/4" Hardwood Sill		LF					
	Hardwood Cap @ Half Wall		LF					
	Plywood Subfloor		SF					
	subtotal							
124813	<u>Entrance Floor Mats & Frames</u>							
	Entrance Wipe-Off Mats		SF					
	subtotal							
140000	<u>CONVEYING SYSTEMS</u>							
142120	<u>Counterweighted Roped Oil Hydraulic Elevator</u>							
	5 Stop Elevator		EA					
	subtotal							

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation

Location: 1087 East Tremont Avenue, Bronx NY 10460

Bidder:

DDC ID#: PV467BRAC-R

AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
210000	FIRE PROTECTION							
210500	Common Work Results for Fire Suppression							
	Floor Sleeves		EA					
	Exterior Wall Sleeve		EA					
	Escutcheons		EA					
	subtotal							
210548	Vibration and Seismic Controls for Fire Suppression Piping and Equipment							
	Seismic Restraints and Certification		LS					
	subtotal							
211100	Facility Fire-Suppression Water Service Piping							
	4" Blk Stl Pipe Sch 40 Grooved		LF					
	3" Blk Stl Pipe Sch 40 Grooved		LF					
	2" Blk Stl Pipe Sch 40 T&C		LF					
	Grooved Fittings		EA					
	125# Cast Iron Fittings		EA					
	Hangers		EA					
	125# Cast Iron Gate Valves		EA					
	125# Cast Iron Check Valves		EA					
	Floor Control Valves		EA					
	Tamper Switches		EA					
	Fire Department Connection		EA					
	Automatic Ball Drip		EA					
	Flow Detector		EA					
	Cutting Oil, Lubricants, Etc.		LS					
	subtotal							

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

DDC ID#: PV467BRAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
211313	Wet Pipe Sprinkler Systems 165 Degree Concealed Heads with Branch Piping, Fittings, and Hangers 165 Degree Sidewall Heads with Branch Piping, Fittings, and Hangers		EA					
	subtotal							
220000	PLUMBING							
220400	Basic Plumbing Requirements		W/Othe					
220514	Common Work Results for Plumbing Concrete Cutting and Rough Patch Floor Sleeves Dielectric Fittings Escutcheons Selective Demolition		LF EA EA EA SF					
	subtotal							
220516	Expansion Fittings and Loops for Plumbing Piping		W/Othe					
220519	Meters and Gages for Plumbing Piping Pressure Gauge Thermometers		EA EA					
	subtotal							

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

DDC ID#: PV467BRAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
220523	General Duty Valves for Plumbing Piping							
	Leader Piping							
	125# Cast Iron Gate Valve		EA					
	Waste & Vent Piping (Pumped Discharge)							
	150# Bronze Gate Valves		EA					
	150# Bronze Check Valves		EA					
	Domestic Water Piping, Irrigations Piping							
	125# Cast Iron Gate Valves		EA					
	150# Bronze Ball Valves		EA					
	150# Bronze Check Valves		EA					
	Curb Cock w/ Box		EA					
	subtotal							
220529	Hangers and Supports for Plumbing Piping and Equipment							
	Pipe Hangers		EA					
	Water Heater Supports		EA					
	subtotal							
220548	Vibration and Seismic Controls for Plumbing Piping and Equipment							
	Seismic Restraint and Certification		LS					
	subtotal							
220553	Identification for Plumbing Piping and Equipment							
	Valve Tags, Pipe Identification		LS					
	subtotal							
220700	Plumbing Insulation							

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

DDC ID#: PV467BRAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
	1" Fiberglass Insulation (Leaders)		LF					
	Roof Drain Sump Insulation		EA					
	1" Fiberglass Insulation (Domestic Water Piping)		FT					
	Aluminum Jacket		FT					
	subtotal							
221116	Domestic Water Piping							
	4" Ductile Iron Pipe		FT					
	Mechanical Joint Fittings		EA					
	Exterior Wall Sleeve		EA					
	Thrust Block		EA					
	4" Blk Stl Pipe Sch 40 Grooved		FT					
	1 1/2 In Dia L Copper Tubing		FT					
	1 1/4 In Dia L Copper Tubing		FT					
	1 In Dia L Copper Tubing		FT					
	3/4 In Dia L Copper Tubing		FT					
	1/2 In Dia L Copper Tubing		FT					
	1 1/2" K Copper Tubing		FT					
	Grooved Fittings		EA					
	Wrought Copper Fittings		EA					
	subtotal							
221119	Domestic Water Piping Specialties							
	Double Check Detector Assembly		EA					
	Reduced Pressure Zone Backflow Preventor		EA					
	Water Meter		EA					
	Non Freeze Wall Hydrants		EA					

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

DDC ID#: PV467BRAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
	Pressure Reducing Valves		EA					
	Wet Tap		EA					
	Roof Flashing		EA					
	Water Hammer Arrestors		EA					
	Flushing and Disinfection		LS					
	subtotal							
221316	Sanitary Waste and Vent Piping							
	4" Sv Wt Cast Iron Pipe		LF					
	Sv Wt Cast Iron Fittings		EA					
	4 In No Hub Cast Iron Pipe		FT					
	3 In No Hub Cast Iron Pipe		FT					
	2 In No Hub Cast Iron Pipe		FT					
	1 1/2 In No Hub Cast Iron Pipe		FT					
	2" Galvanized Stl Pipe Sch 40 T&C		FT					
	No Hub Cast Iron Fittings		EA					
	150# Gal Maleable Fittings		EA					
	Gaskets, Lubricants, Etc.		LS					
	No Hub Couplings Etc.		LS					
	subtotal							
221319	Sanitary Waste Pipng Specialties							
	Trench Drains		LF					
	Floor Drains		EA					
	Roof Flashings		EA					
	Fresh Air Inlet		EA					
	subtotal							

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation

Location: 1087 East Tremont Avenue, Bronx NY 10460

Bidder:

DDC ID#: PV467BRAC-R

AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
221413	Facility Storm Drainage Piping							
	3" Sv Wt Cast Iron Pipe		FT					
	4 In No Hub Cast Iron Pipe		FT					
	2" Galvanized Stl Pipe Sch 40 T&C		FT					
	Sv Wt Cast Iron Fittings		EA					
	No Hub Cast Iron Fittings		EA					
	150# Galvanized Maleable Fittings		EA					
	No Hub Couplings Etc.		LS					
	subtotal							
221423	Storm Drainage Piping Specialties							
	Roof Drains		EA					
	subtotal							
221429	Sump Pumps							
	SP 2A,B Duplex Sump Pump 30 GPM @ 22', 1/2 HP w/ Reciever, Panel		EA					
	subtotal							
223300	Electric Domestic Water Heaters							
	EHWH 1 Electric Water Heater 4,150 Watt		EA					
	EHWH 2 Electric Water Heater 8,320 Watt		EA					
	subtotal							
224000	Plumbing Fixtures							
	Floor Mounted Accessible Close Coupled Water Closets		EA					
	Wall Hung Lavatories Accessible		EA					

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation

Location: 1087 East Tremont Avenue, Bronx NY 10460

Bidder:

DDC ID#: PV467BRAC-R

AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
	Utility Sink		EA					
	Mop Receptors		EA					
	Kitchen Sink		EA					
	Lavatory Carriers		EA					
	subtotal							
224700	Drinking Fountains and Water Coolers							
	Electric Water Coolers		EA					
	subtotal							
226314	Facility Natural Gas Piping							
	3" Blk Stl Pipe Sch 40 PE - Riser Only		LF					
	subtotal							
230000	HVAC							
230513	Common Motor Requirements for HVAC Equipment		W/Equipment					
230514	Common Work Results for HVAC							
	Dielectric Fittings		EA					
	Escutcheons		EA					
	Concrete Bases		EA					
	Rigging, Scaffolding, and Hoisting		LS					
	Coordination Drawings, As Builts, Submittals, O&M's		LS					
	Selective Demolition		SF					
	subtotal							
230515	Enclosed Controllers							

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation

Location: 1087 East Tremont Avenue, Bronx NY 10460

Bidder:

DDC ID#: PV467BRAC-R

AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
	Variable Frequency Drives		EA					
	Magnetic Motor Starters		EA					
	subtotal							
230516	Expansion Fittings and Loops for HVAC Piping		W/Equipment					
230517	Sleeves and Sleeve Seals for HVAC Piping		W/Equipment					
230519	Meters and Gages for HVAC Piping							
	Pressure Gauges		EA					
	Thermometers		EA					
	subtotal							
230523	General Duty Valves for HVAC Piping							
	125# Cast Iron Gate Valves		EA					
	150# Bronze Ball Valves		EA					
	150# Drain Valves		EA					
	125# Cast Iron Check Valves		EA					
	Refrigerant Isolation Valves		EA					
	subtotal							
230529	Hangers and Supports for HVAC Piping and Equipment							
	Hangers		EA					
	subtotal							
230548	Vibration and Seismic Controls for HVAC Piping and Equipment							
	Seismic Restraint and Certification		LS					
	subtotal							

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation

Location: 1087 East Tremont Avenue, Bronx NY 10460

Bidder:

DDC ID#: PV467BRAC-R

AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
230553	Identification for HVAC Piping and Equipment							
	Valve Tags, Pipe Identification		LS					
	subtotal							
230700	HVAC Insulation		With Piping					
230713	Duct Insulation		With Piping					
230719	HVAC Piping Insulation		With Piping					
230850	Testing Adjusting and Balancing							
	Testing and Balancing		LS					
	subtotal							
230900	Instrumentation and Control for HVAC							
	P1,2, Inline Circulators 110 GPM @ 75 Ft, 5 HP		PTS					
	EF 1 Cabinet Fan 200 CFM @ .5", 81 Watts		PTS					
	EF 2 Inline Centrifugal Fan 200 CFM @ .5", .1 HP		PTS					
	TE 1,2,3 Ceiling Ventilator 150 CFM @ .5", 29 Watts		PTS					
	TE 4,5,6,7 Ceiling Ventilator 100 CFM @ .5", 22 Watts		PTS					
	DR 1 Centrifugal Fan 1,500 CFM @ 1", 1/2 HP		PTS					
	B1,2,3 Condensing Gas Boilers 360 MBH		PTS					
	OAU 1,2 Packaged Ventilation Unit 3,600 CFM Gas/ Electric		PTS					
	Fin Tube Radiation Settings		PTS					
	Operators Work Station		LS					
	subtotal							
230993	Sequence of Operation for HVAC Controls		LS					

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

DDC ID#: PV467BRAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
	subtotal							
232113	Hydronic Piping							
	4" Blk Stl Pipe Sch 40 PE		FT					
	3" Blk Stl Pipe Sch 40 PE		FT					
	1" L Copper Tubing		FT					
	150# Buttweld Fittings		EA					
	Wrought Copper Fittings		EA					
	125# Cast Iron Balancing Valves		EA					
	150# Bronze Balancing Valves		EA					
	125# Cast Iron Strainers		EA					
	150# Bronze Strainers		EA					
	125# Cast Iron Control Valves		EA					
	150# Bronze Control Valves		EA					
	Temperature and Pressure Relief Valve		EA					
	Stainless Braided Flexible Connections		EA					
	Reduced Pressure Zone Backflow Preventor		EA					
	Pressure Reducing Valve		EA					
	Float Air Vent		EA					
	Manual Air Vents		EA					
	subtotal							
232123	Hydronic Pumps							
	P1.2, Inline Circulators 110 GPM @ 75 Ft, 5 HP		EA					
	Air Separator		EA					
	Expansion Tanks		EA					
	subtotal							

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation

Location: 1087 East Tremont Avenue, Bronx NY 10460

Bidder:

DDC ID#: PV467BRAC-R

AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
233113	Metal Ducts							
	Galvanized Ductwork		LBS					
	Black Iron Ductwork		LBS					
	Aluminum Ductwork		LBS					
	Type 316SS Duct Work		LBS					
	Fan Coil Pans		EA					
	subtotal							
233300	Air Duct Accessories							
	Volume Dampers		EA					
	Flexible Duct, Preinsulated		EA					
	Flexible Connections		EA					
	Fire Dampers		SF					
	Fire Smoke Dampers		EA					
	Motorized Dampers		EA					
	Kynar Finish Louver		EA					
	Roof Curbs		EA					
	Kiln Exhaust Hoods		EA					
	subtotal							
233413	Axial Fans		W/Ventilators					
233423	HVAC Power Ventilators							
	EF 1 Cabinet Fan 200 CFM @ .5", 81 Watts		EA					
	EF 2 Inline Centrifugal Fan 200 CFM @ .5", 1 HP		EA					
	TE 1, 1A, 2, 3 Ceiling Ventilator 100 CFM @ .5", 23 Watts		EA					

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

DDC ID#: PV467BRAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
	TE 4,5,6,7 Ceiling Ventilator 100 CFM @ .5", 22 Watts		EA					
	DR 1 Centrifugal Fan 2,000 CFM @ 1", 1/2 HP		EA					
	subtotal							
233713	Diffusers and Registers							
	Supply Air Grilles		EA					
	Supply Air Diffusers		EA					
	Return Air Grilles		EA					
	Exhaust Grilles		EA					
	subtotal							
234100	Air Filters		With Equipment					
235100	Breeching, Chimneys, and Stacks							
	Stainless Flue/ Combustion Air Piping		LF					
	Concentric Vents		EA					
	subtotal							
235113	Draft Control Devices		With Equipment					
235216	Condensing Boilers							
	B1,2,3 Condensing Gas Boilers 399 MBH		EA					
	Closed Circuit Chemical Feed Programs		EA					
	subtotal							
237433	Packaged, Outdoor, Heating and Cooling Makeup Air Conditioner							
	OAU 1,2 Packaged Ventilation Unit 2,100 CFM Gas/ Electric		EA					

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation

Location: 1087 East Tremont Avenue, Bronx NY 10460

Bidder:

DDC ID#: PV467BRAC-R

AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
	subtotal							
238233	Convectors							
	HE 1 Heating Element 4 1/4"x4 1/4"x 1"		LF					
	subtotal							
260000	ELECTRICAL							
260500	Common Work Results For Electrical							
	Temp Power and Lighting		LS					
	Misc Demo		LS					
	subtotal							
260519	Low Voltage Electrical Power Conductors and Cables							
	MC Cable		LF					
	Plenum Cable		LF					
	#12 THHN CU		LF					
	#10 THHN CU		LF					
	#8 THHN CU		LF					
	#6 THHN CU		LF					
	#3 THHN CU		LF					
	#2 THHN CU		LF					
	#1 THHN CU		LF					
	#1/0 THHN CU		LF					
	#3/0 THHN CU		LF					
	#4/0 THHN CU		LF					
	subtotal							

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

DDC ID#: PV467BRAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
260526	<u>Grounding & Bonding For Electrical Systems</u>							
	Ground Bar		EA					
	subtotal							
260533	<u>Raceways, Boxes and Fittings</u>							
	3/4" RGS CDT		LF					
	3/4" Emt		LF					
	1" Emt		LF					
	1 1/4" Emt		LF					
	1 1/2" Emt		LF					
	2" Emt		LF					
	2 1/2" Emt		LF					
	3" Emt		LF					
	4" RGS CDT		LF					
	4" PVC CDT		LF					
	Found Sleeve, 6" RGS		LS					
	800 Amp Service Trough		EA					
	Hangers and Supports		LS					
	subtotal							
260553	<u>Identification for Electrical Systems</u>		With Electrical					
260923	<u>Lighting Control Devices</u>							
	Switches		EA					
	Occupancy Sensor OS, WS		EA					
	Power Pack OS PP		EA					
	Time Clock		EA					

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation

Location: 1087 East Tremont Avenue, Bronx NY 10460

Bidder:

DDC ID#: PV467BRAC-R

AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
	8-Pole Lighting Contactor		EA					
	6-Zone Control Unit		EA					
	4-Scene control Station		EA					
	HP Module		EA					
	subtotal							
262416	Panelboards							
	125 Amp Panel Board		EA					
	225 Amp Panel Board		EA					
	225 Amp Panel Board, 2-Section		EA					
	600 Amp Main Distr Panel Board		EA					
	subtotal							
262713	Electricity Metering							
	100 Amp Meter Cabinet		EA					
	200 Amp Meter Cabinet		EA					
	600 Amp Meter Cabinet		EA					
	subtotal							
262726	Wiring Devices							
	Receptacles		EA					
	Junction Boxes/Misc		EA					
	GFI Receptacles		EA					
	Receptacles Quad		EA					
	Var Speed Switch		EA					
	Photocell		EA					

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

DDC ID#: PV467BRAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
	Time Clock		EA					
	8-Pole Lighting Contactor		EA					
	Manual Snap Switch Starter		EA					
	Receptacle A/C 20A, 2p		EA					
	Motorized Damper conn		EA					
	Junc Box, WP		EA					
	Receptacles GFI WP		EA					
	Floor Power Quad GFI Outlet		EA					
	Floor Power Quad Outlet		EA					
	Receptacles 30 Amp		EA					
	subtotal							
262813	Fuses		With Electrical					
262816	Enclosed Switches and Circuit Breakers							
	20/2 Amp Disconnect		EA					
	30/2 Amp Disconnect		EA					
	30 Amp Disconnect		EA					
	60/2 Amp Disconnect		EA					
	60 Amp Disconnect		EA					
	200 Amp Disconnect, Elev		EA					
	Switchboards, Service							
	800 Amp Service End Box		EA					
	600 Amp Service Disconnect		EA					
	100 Amp Service Disconnect		EA					
	200 Amp Service Disconnect		EA					
	subtotal							

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

DDC ID#: PV467BRAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
265100	Interior Lighting							
265113	Architectural Luminaires, Lamps and Ballasts							
265600	Exterior Lighting							
	Type F4		EA					
	Type F9,9A		EA					
	Type F14		EA					
	Type F15		EA					
	Type F18		EA					
	Type F19 2'		EA					
	Type F19A 4'		EA					
	Type F20		EA					
	Type F21		EA					
	Type F23		EA					
	Large Paddle Fan		EA					
	Type C4		EA					
	Type C6		EA					
	Type C8		EA					
	Type C9		EA					
	Type X1		EA					
	Type H2		EA					
	Dark Room in Use Light		EA					
	Elev Pit Light		EA					
	Emergency Battery w/ 2 Heads		EA					
	Exit/ Emergency Battery Combo		EA					
	Exit		EA					
	Exit WP		EA					

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

DDC ID#: PV467BRAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
	Type X3		EA					
	Emergency Battery Ballast		EA					
	Type F3		LF					
	Type F6,A,B,C,D		LF					
	Type F8		LF					
	Type F10		LF					
	Type F22		LF					
	Type TR1,2 Track		LF					
	Type TR3 Track		LF					
	Type TR4 Track		LF					
	Type M1, M1A, M2,M4 Track Lt		EA					
	Type H1 Track Lt		EA					
	Type L1 Solar pavers		EA					
	Type L3 conn pts		EA					
	Type L3		LF					
	subtotal							
270000	COMMUNICATIONS							
270500	Common Work Results for Communications							
271100	Communications Equipment Roof Fittings							
271500	Communications Horizontal Cabling:							
275123.5	Educational Intercommunications and Systems							
	Cat 5e		LF					
	Cat 6e		LF					
	Tel Term Board		EA					
	Data Patch Panel		EA					

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

DDC ID#: PV467BRAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
	Tel Outlet 1c		EA					
	Data Outlet 1c		EA					
	WAP Outlet 1c		EA					
	Tel/Data Outlet 2c		EA					
	Tel/Data Outlet 2c WP		EA					
	Tel/Data Outlet 5c		EA					
	Tel Outlet 4c		EA					
	subtotal							
280000	ELECTRONIC SAFETY AND SECURITY							
280500	Common Work Results for Electronic Safety and Security							
280513	Conductors and Cables for Electronic Safety and Security							
	3/4" Rigid, 3#10		LF					
	2" Rigid, riser conduit		LF					
	3/4" Emt, 4#12		LF					
	3/4" Emt		LF					
	Teflon Cable		LF					
	3/4" Emt		LF					
	1" Emt		LF					
	2" Emt		LF					
	Teflon Cable 1Pr #18		LF					
	Teflon Cable 4Pr #18		LF					
	Cat 6e		LF					
	subtotal							
281600	Intrusion Detection							
	23		LS					

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation

Location: 1087 East Tremont Avenue, Bronx NY 10460

Bidder:

DDC ID#: PV467BRAC-R

AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
	DVR, Monitoring		LS					
	UPS, 1500VA		LS					
	Battery Backup		LS					
	Motion Sensor		EA					
	Siren w/ Strobe		EA					
	Door Contact		EA					
	Keypad		EA					
	CCTV Camera		EA					
	CCTV Camera WP		EA					
	Intercom Controller		EA					
	Intercom Station		EA					
	Intercom Station WP		EA					
	subtotal							
283111	Digital, Addressable Fire-Alarm System							
	Pull Station		EA					
	Audible/Visual		EA					
	Smoke, Heat Detector		EA					
	Strobe		EA					
	Horn		EA					
	Duct Detector		EA					
	Annunciator		EA					
	Central Equipment		LS					
	Fu Cutout		EA					
	Purge Key		EA					
	Misc Connections		EA					

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

DDC ID#: PV467BRAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
	Fire Smoke Damper Connections		EA					
	subtotal							
310000	EARTHWORK							
312000	Earthwork							
	6" Gravel Subbase		CY					
	subtotal							
312319	Dewatering		LS					
	subtotal							
315000	Excavation Support and Protection							
	Protect Ex. Retaining Wall		LS					
	Temp. Shoring Partitions		SF					
	Shoring at New Retaining Wall		SF					
	subtotal							
320000	EXTERIOR IMPROVEMENTS							
321400	Unit Paving							
	9" Gravel Subbase Under Exterior Path Pavers		CY					
	Concrete Pavers		SF					
	subtotal							
329343	Street Trees		LS					
	subtotal							

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation

Location: 1087 East Tremont Avenue, Bronx NY 10460

Bidder:

DDC ID#: PV467BRAC-R

AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
330000	UTILITIES							
334600	Non-Woven Geotextile and Composite Drainage Board							
	Composite Drainage Board W/ Non-Woven Geotextile Fabric		SF					
	subtotal							
TOTAL CONTRACT 1 - GENERAL CONSTRUCTION BID ALTERNATE 1								

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

DDC ID#: PV467BRAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
CONTRACT 1 - GENERAL CONSTRUCTION BID ALTERNATE 2 (BID ALTERNATE 1 + ALTERNATE 2 WORK)								
ALTERNATE 2 WORK								
AC for Floors 1, 2 and 4								
024119	Selective Demolition							
	Cut Floor for Shafts & Piping & Frame New Openings		SF					
	subtotal							
051200	Structural Steel							
	Structural Steel Dunnage		LBS					
	subtotal							
061000	Rough Carpentry							
	Floor Framing @ New Openings		EA					
	subtotal							
078400	Firestops & Smoke seals							
	Firestopping		LOC					
	subtotal							
092500	Gypsum Drywall (Walls)							
	2 1/2" Mtl. Stud W/ 2 Layer 5/8" GWB One Side & 1 Layers Core Board							
	Other Side , W/ Sound Attenuation Blanket (Taped & Spackled) - Shaft Wall		SF					
	Paint Walls		SF					
	subtotal							

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

DDC ID#: PV467BRAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
230000	HVAC							
230900	CONTROLS							
	CU 1 Variable Volume Condensing Unit 7.5 Ton		PTS					
	CU 2 Variable Volume Condensing Unit 8.5 Ton		PTS					
	CU 3 Constant Volume Condensing Unit 4 Ton		PTS					
	CU 4 Constant Volume Condensing Unit 2 Ton		PTS					
	CU 5 Variable Volume Condensing Unit 10 Ton		PTS					
	CU 6 Variable Volume Condensing Unit 6 Ton		PTS					
	CU 7 Variable Volume Condensing Unit 8 Ton		PTS					
	CRU-1,2 Condensate Removal Units		PTS					
	FCU A DX Fan Coil Unit 1 Ton		PTS					
	FCU B DX Fan Coil Unit 1 1/2 Ton		PTS					
	FCU C DX Fan Coil Unit 2 Ton		PTS					
	FCU D DX Fan Coil Unit 2 1/2 Ton		PTS					
	FCU DR DX Fan Coil Unit 4 Ton		PTS					
	CFU A Ceiling DX Fan Coil Unit 1 Ton		PTS					
	CFU B Ceiling DX Fan Coil Unit 1.3 Ton		PTS					
	AHU SR Split AC System 3 Ton w/ Humidifier, Condenser		PTS					
	subtotal							
232113	PIPING							
	Refrigeration Piping							
	1 5/8" ACR Tubing		LF					
	7/8" ACR Tubing		LF					
	5/8" ACR Tubing		LF					
	3/8" ACR Tubing		LF					
	Wrought Copper Fittings		EA					

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

DDC ID#: PV467BRAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
	Expansion Valves		EA					
	Filter Dryers		EA					
	Solenoid Valves		EA					
	Moisture Indicators		EA					
	VRV Manifolds		EA					
	Purging and Charging		LS					
	Silver Braze, Gas, Etc.		LS					
	subtotal							
238126	Split System Air-Conditioners							
	CU 1 Variable Volume Condensing Unit 8 Ton - Gallery C		EA					
	CU 2 Variable Volume Condensing Unit 8 Ton - Gallery A & B		EA					
	CU 3 Constant Volume Condensing Unit 4 Ton - Dark Room		EA					
	CU 4 Constant Volume Condensing Unit 4 Ton - Lease Space		EA					
	Lease Space, Office 203, Computer Lab & 4th Finance & Executive		EA					
	CU 6 Variable Volume Condensing Unit 6 Ton - 4th FI Workshop Paint & Print		EA					
	CU 7 Variable Volume Condensing Unit 8 Ton - 4th FI Workshop Ceramics		EA					
	CRU-1,2 Condensate Removal Units		EA					
	subtotal							
238219	Fan Coil Units							
	FCU A DX Fan Coil Unit 1 Ton		EA					
	FCU B DX Fan Coil Unit 1 1/2 Ton		EA					
	FCU C DX Fan Coil Unit 2 Ton		EA					
	FCU D DX Fan Coil Unit 2 1/2 Ton		EA					
	FCU DR DX Fan Coil Unit 4 Ton		EA					
	CFU A Ceiling DX Fan Coil Unit 1 Ton		EA					

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

DDC ID#: PV467BRAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
	CFU B Ceiling DX Fan Coil Unit 1.3 Ton		EA					
	AHU SR Split AC System 3 Ton w/ Humidifier, Condenser		EA					
	subtotal							
260000	ELECTRICAL							
260500	Common Work Results For Electrical							
	Install Nema 0 Comb Starter FBO		EA					
	Install Nema 2 Comb Starter FBO		EA					
	Install 5HP VFD's FBO		EA					
	subtotal							
260519	Low Voltage Electrical Power Conductors and Cables							
	#2 THHN CU, CU Riser		LF					
	250Mcm, CU Riser		LF					
	#12 THHN CU, FCU's		LF					
	#8 THHN CU		LF					
	#10 THHN CU		LF					
	subtotal							
260533	Raceways, Boxes and Fittings							
	3" Emt, CU Riser		LF					
	3/4" Emt, FCU's		LF					
	subtotal							
262413	Switchboards, Service							
	400 Amp Service Disconnect		EA					
	subtotal							

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

DDC ID#: PV467BRAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
	Delete Receptacle A/C 20A, 2p from Base Estimate		EA					
	TOTAL ALTERNATE 2 WORK							
	TOTAL CONTRACT 1 - GENERAL CONSTRUCTION BID ALTERNATE 2 (BID ALTERNATE 1 + ALTERNATE 2 WORK)							

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

DDC ID#: PV467BRAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
CONTRACT 1 - GENERAL CONSTRUCTION BID ALTERNATE 3 (BID ALTERNATE 1 + ALTERNATE 2 WORK + ALTERNATE 3 WORK)								
ALTERNATE 3 WORK								
	Replace Windows							
024119	Selective Demolition							
	Remove Existing Windows		SF					
	Remove Associated Trim		LF					
	Protect Adjacent Construction		LF					
	subtotal							
049000	Masonry Restoration & Cleaning							
	Prep Masonry Opening for New Window Installation		LF					
	subtotal							
064000	Cabinetry & Millwork							
	New Trim		LF					
	subtotal							
085113	Aluminum Windows & Doors							
	Furnish & Install New Windows		SF					
	subtotal							
	Delete - Rem/Reinst Windows from Base Estimate		EA					
	TOTAL ALTERNATE 3 WORK							

THIS PAGE INTENTIONALLY LEFT BLANK



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

CONTRACTOR'S BID BREAKDOWN FORM

CONTRACT 1 - GENERAL CONSTRUCTION

Project: Bronx River Art Center Renovation
Location: 1087 East Tremont Avenue, Bronx NY 10460
Bidder:

DDC ID#: PV467BRAC-R
AGENCY: DCA

CSI Number	Description	Quantity	Unit	Unit Cost Of Material	Total Cost Of Material	Unit Cost Of Labor	Total Cost Of Labor	Total Cost: Materials & Labor
	TOTAL CONTRACT 1 - GENERAL CONSTRUCTION BID ALTERNATE 3 (BID ALTERNATE 1 + ALTERNATE 2 WORK + ALTERNATE 3 WORK)							

THIS PAGE INTENTIONALLY LEFT BLANK

PLA PROJECT**ATTACHMENT 1 - BID INFORMATION
PROJECT ID: PV467BRAC-R****DESCRIPTION AND LOCATION OF WORK:**

Bronx River Art Center Renovation
1087 East Tremont Avenue
Bronx, NY 10460
E-PIN: 85013B0075 / DDC PIN: 8502013PV0012C

DOCUMENTS AVAILABLE AT:

Department of Design and Construction, Contract Section
30-30 Thomson Avenue - First Floor, Long Island City, NY 11101

SUBMISSION OF BIDS BEFORE BID OPENING:**TIME TO SUBMIT:**

On or Before: **THURSDAY, MAY 23, 2013**

BIDS MUST BE CLOCKED IN PRIOR TO BID OPENING

PLACE TO SUBMIT:

Department of Design and Construction, Contract Section (located behind Security Desk)
30-30 Thomson Avenue - First Floor, Long Island City, NY 11101

BID OPENING:

PLACE OF BID OPENING:	Department of Design and Construction Contract Section 30-30 Thomson Avenue – First Floor Long Island City, NY 11101
DATE AND HOUR:	THURSDAY, MAY 23, 2013 @ 2:00 PM
	LATE BIDS WILL NOT BE ACCEPTED

PRE-BID CONFERENCE:

PLACE	Bronx River Art Center 1087 East Tremont Avenue Bronx, NY 10460
DATE AND HOUR	THURSDAY, MAY 9, 2013 AT 10:00AM
MANDATORY OR OPTIONAL	OPTIONAL

BID SECURITY:

Bid Security is required in the amount set forth below; provided, however, bid security is not required if the TOTAL BID PRICE set forth on the Bid Form is less than \$1,000,000.

- (1) Bond in an amount not less than 10% of the TOTAL BID PRICE set forth on the Bid Form, OR
- (2) Certified Check in an amount not less than 2% of the TOTAL BID PRICE set forth on the Bid Form

PERFORMANCE AND PAYMENT SECURITY:

Required for Contracts in excess of \$1,000,000.00. Performance and Payment Security shall each be in an amount equal to 100% of the Contract Price

AGENCY CONTACT PERSON:

Lorraine Holley, 30-30 Thomson Avenue - First Floor, Long Island City, Queens, NY 11101
Telephone (718) 391-2200 or (718) 391-2601 Fax: (718) 391-2615

**BID BOOKLET
PART B**

THIS PAGE INTENTIONALLY LEFT BLANK

SAFETY QUESTIONNAIRE

The bidder must include, with its bid, all information requested on this Safety Questionnaire. Failure to provide a completed and signed Safety Questionnaire at the time of bid opening may result in disqualification of the bid as non-responsive.

1. Bidder Information:

Company Name: _____

DDC Project Number: _____

Company Size: _____ Ten (10) employees or less
 _____ Greater than ten (10) employees

_____ Company has previously worked for DDC

2. Type(s) of Construction Work

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

3. Experience Modification Rate:

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

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

YEAR	<u>INTRASTATE</u> RATE	<u>INTERSTATE</u> RATE
_____	_____	_____
_____	_____	_____
_____	_____	_____

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

4. OSHA Information:

_____ Contractor has received a willful violation issued by OSHA or New York City Department of Buildings (NYCDOB) within the last three years.

_____ Contractor has had an incident requiring OSHA notification within 8 hours (i.e., fatality, or hospitalization of three or more employees).

The Occupational Safety and Health Act (OSHA) of 1970 requires employers with ten or more employees, on a yearly basis to complete and maintain on file the form entitled "Log of Work-related Injuries and Illnesses". This form is commonly referred to as the OSHA 300 Log (OSHA 200 Log for 2001 and earlier).

The OSHA 300 Log must be submitted for the last three years for contractors with more than ten employees.

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

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

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

YEAR	TOTAL NUMBERS OF HOURS WORKED BY EMPLOYEES	INCIDENT RATE
_____	_____	_____
_____	_____	_____
_____	_____	_____

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

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

5. Safety Performance on Previous DDC Project(s)

_____ Contractor previously audited by the DDC Office of Site Safety.

DDC Project Number(s): _____

_____ Accident on previous DDC Project(s).

_____ Fatality or Life-altering Injury on DDC Project(s) within the last three years.
[Examples of a life-altering injury include loss of limb, loss of a sense (e.g., sight, hearing), or loss of neurological function].

Date: _____

By: _____
(Signature of Owner, Partner, Corporate Officer)

Title: _____

THIS PAGE INTENTIONALLY LEFT BLANK

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 facsimile or in writing and will specify the types of information which must be submitted.

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 on pages 28 through 30 of this Bid Booklet. The Project Reference Form consists of 3 parts: (1) Similar 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 shall submit such additional information as the Commissioner may require, including without limitation, 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.

A. PROJECT REFERENCES – SIMILAR CONTRACTS COMPLETED BY THE BIDDER

List all contracts substantially completed within the last 4 years similar to the contract being awarded, 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

B. PROJECT REFERENCES – 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

C. PROJECT REFERENCES – 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

THIS PAGE INTENTIONALLY LEFT BLANK

**OFFICE OF THE MAYOR
BUREAU OF LABOR SERVICES
CONTRACT CERTIFICATE**

To be completed if the contract is less than \$1,000,000

Contractor: _____

Address: _____

Telephone Number: _____

Name and Title of Signatory: _____

Contracting Agency or Owner: _____

Project Number: _____

Proposed Contract Amount: _____

Description and Address of Proposed Contract: _____

Names of Subcontractors in the amount of 750,000 or more on this contract (if not known at this time, so state indicating that trades will be subcontracted):

I, (fill in name of person signing) _____,
hereby affirm that I am authorized by the above-named contractor to certify that said contractor's proposed contract with the above-named owner or city agency is less than \$1,000,000. This affirmation is made in accordance with Executive Order No. 50 (1980) as amended and its implementing regulations.

Date

Signature

WILLFUL OR FRAUDULENT FALSIFICATION OF ANY DATA OR INFORMATION SUBMITTED HEREWITH MAY RESULT IN THE TERMINATION OF ANY CONTRACT BETWEEN THE CITY AND THE BIDDER OR CONTRACTOR AND BAR THE BIDDER OR CONTRACTOR FROM PARTICIPATION IN ANY CITY CONTRACT FOR A PERIOD OF UP TO THREE YEARS. FURTHER, SUCH FALSIFICATION MAY RESULT IN CRIMINAL PROSECUTION.

THIS PAGE INTENTIONALLY LEFT BLANK

VENDEX COMPLIANCE

(A) **Vendex Fees:** Pursuant to Procurement Policy Board Rule 2-08(f)(2), the contractor will be charged a fee for the administration of the VENDEX system, including the Vendor Name Check process, if a Vendor Name Check review is required to be conducted by the Department of Investigation. The contractor shall also be required to pay the applicable required fees for any of its subcontractors for which Vendor Name Check reviews are required. The fee(s) will be deducted from payments made to the contractor under the contract. For contracts with an estimated value of less than or equal to \$1,000,000, the fee will be \$175 per Vendor Name Check review. For contracts with an estimated value of greater than \$1,000,000, the fee will be \$350 per Vendor Name Check review.

(B) **Confirmation of Vendex Compliance:** The Bidder shall submit this Confirmation of Vendex Compliance to the Department of Design and Construction, Contracts Section, 30-30 Thomson Avenue – First Floor, Long Island City, NY 11101.

Bid Information: The Bidder shall complete the bid information set forth below.

Name of Bidder: _____
Bidder's Address: _____
Bidder's Telephone Number: _____
Bidder's Fax Number: _____
Date of Bid Opening: _____
Project ID: _____

Vendex Compliance: To demonstrate compliance with Vendex requirements, the Bidder shall complete either Section (1) or Section (2) below, whichever applies.

- (1) **Submission of Vendex Questionnaires to MOCS:** By signing in the space provided below, the Bidder certifies that as of the date specified below, the Bidder has submitted Vendex Questionnaires to the Mayor's Office of Contract Services, Attn: VENDEX, 253 Broadway, 9th Floor, New York, New York 10007.

Date of Submission: _____

By: _____
(Signature of Partner or corporate officer)

Print Name: _____

- (2) **Submission of Certification of No Change to DDC:** By signing in the space provided below, the Bidder certifies that it has read the instructions in a "Vendor's Guide to Vendex" and that such instructions do not require the Bidder to submit Vendex Questionnaires. The Bidder has completed **TWO ORIGINALS** of the Certification of No Change set forth on the next page of this Bid Booklet.

By: _____
(Signature of Partner or corporate officer)

Print Name: _____

THIS PAGE INTENTIONALLY LEFT BLANK

DIRECTIONS: Please execute two originals (both with original signature).
Please forward directly to the agency (not M.O.C.S.).



Certificate of No Change Form

- Please submit two completed forms. Copies will not be accepted.
- Please send both copies to the agency that requested it, unless you are advised to send it directly to the Mayor's Office of Contract Services (MOCS).
- A materially false statement willfully or fraudulently made in connection with this certification, and/or the failure to conduct appropriate due diligence in verifying the information that is the subject of this certification, may result in rendering the submitting entity non-responsible for the purpose of contract award.
- A materially false statement willfully or fraudulently made in connection with this certification may subject the person making the false statement to criminal charges

I, _____, being duly sworn, state that I have read
Enter Your Name

and understand all the items contained in the vendor questionnaire and any submission of change as identified on page one of this form and certify that as of this date, these items have not changed. I further certify that, to the best of my knowledge, information and belief, those answers are full, complete, and accurate; and that, to the best of my knowledge, information, and belief, those answers continue to be full, complete, and accurate.

In addition, I further certify on behalf of the submitting vendor that the information contained in the principal questionnaire(s) and any submission of change identified on page two of this form have not changed and have been verified and continue, to the best of my knowledge, to be full, complete and accurate.

I understand that the City of New York will rely on the information supplied in this certification as additional inducement to enter into a contract with the submitting entity.

Vendor Questionnaire *This section is required.*

This refers to the vendor questionnaire(s) submitted for the vendor doing business with the City.

Name of Submitting Entity: _____

Vendor's Address: _____

Vendor's EIN or TIN: _____ Requesting Agency: _____

Are you submitting this Certification as a parent? (Please circle one) Yes No

Signature date on the last full vendor questionnaire signed for the submitting vendor: _____

Signature date on change submission for the submitting vendor: _____

Principal Questionnaire

This section refers to the most recent principal questionnaire submissions.



Principal Name	Date of signature on last full Principal Questionnaire	Date(s) of signature on submission of change
1		
2		
3		
4		
5		
6		

☐ Check if additional changes were submitted and attach a document with the date of additional submissions.

Certification *This section is required.*

This form must be signed and notarized. Please complete this twice. Copies will not be accepted.

Certified By:

Name (Print)

Title

Name of Submitting Entity

Signature

Date

Notarized By:

Notary Public

County License Issued

License Number

Sworn to before me on: _____
Date

DIRECTIONS: Please execute two originals (both with original signature).
Please forward directly to the agency (not M.O.C.S.).

Certificate of No Change Form



- Please submit two completed forms. Copies will not be accepted.
- Please send both copies to the agency that requested it, unless you are advised to send it directly to the Mayor's Office of Contract Services (MOCS).
- A materially false statement willfully or fraudulently made in connection with this certification, and/or the failure to conduct appropriate due diligence in verifying the information that is the subject of this certification, may result in rendering the submitting entity non-responsible for the purpose of contract award.
- A materially false statement willfully or fraudulently made in connection with this certification may subject the person making the false statement to criminal charges

I, _____, being duly sworn, state that I have read
Enter Your Name

and understand all the items contained in the vendor questionnaire and any submission of change as identified on page one of this form and certify that as of this date, these items have not changed. I further certify that, to the best of my knowledge, information and belief, those answers are full, complete, and accurate; and that, to the best of my knowledge, information, and belief, those answers continue to be full, complete, and accurate.

In addition, I further certify on behalf of the submitting vendor that the information contained in the principal questionnaire(s) and any submission of change identified on page two of this form have not changed and have been verified and continue, to the best of my knowledge, to be full, complete and accurate.

I understand that the City of New York will rely on the information supplied in this certification as additional inducement to enter into a contract with the submitting entity.

Vendor Questionnaire *This section is required.*

This refers to the vendor questionnaire(s) submitted for the vendor doing business with the City.

Name of Submitting Entity: _____

Vendor's Address: _____

Vendor's EIN or TIN: _____ Requesting Agency: _____

Are you submitting this Certification as a parent? (Please circle one) Yes No

Signature date on the last full vendor questionnaire signed for the submitting vendor: _____

Signature date on change submission for the submitting vendor: _____

Principal Questionnaire

This section refers to the most recent principal questionnaire submissions.



Principal Name	Date of signature on last full Principal Questionnaire	Date(s) of signature on submission of change
1		
2		
3		
4		
5		
6		

☐ Check if additional changes were submitted and attach a document with the date of additional submissions.

Certification *This section is required.*

This form must be signed and notarized. Please complete this twice. Copies will not be accepted.

Certified By:

Name (Print)

Title

Name of Submitting Entity

Signature

Date

Notarized By:

Notary Public

County License Issued

License Number

Sworn to before me on: _____
Date

IRAN DIVESTMENT ACT COMPLIANCE RIDER

FOR NEW YORK CITY CONTRACTORS

The Iran Divestment Act of 2012, effective as of April 12, 2012, is codified at State Finance Law ("SFL") §165-a and General Municipal Law ("GML") §103-g. The Iran Divestment Act, with certain exceptions, prohibits municipalities, including the City, from entering into contracts with persons engaged in investment activities in the energy sector of Iran. Pursuant to the terms set forth in SFL §165-a and GML §103-g, a person engages in investment activities in the energy sector of Iran if:

- (a) The person provides goods or services of twenty million dollars or more in the energy sector of Iran, including a person that provides oil or liquefied natural gas tankers, or products used to construct or maintain pipelines used to transport oil or liquefied natural gas, for the energy sector of Iran; or
- (b) The person is a financial institution that extends twenty million dollars or more in credit to another person, for forty-five days or more, if that person will use the credit to provide goods or services in the energy sector in Iran and is identified on a list created pursuant to paragraph (b) of subdivision three of Section 165-a of the State Finance Law and maintained by the Commissioner of the Office of General Services.

A bid or proposal shall not be considered for award nor shall any award be made where the bidder or proposer fails to submit a signed and verified bidder's certification.

Each bidder or proposer must certify that it is not on the list of entities engaged in investment activities in Iran created pursuant to paragraph (b) of subdivision 3 of Section 165-a of the State Finance Law. In any case where the bidder or proposer cannot certify that they are not on such list, the bidder or proposer shall so state and shall furnish with the bid or proposal a signed statement which sets forth in detail the reasons why such statement cannot be made. The City of New York may award a bid to a bidder who cannot make the certification on a case by case basis if:

- (1) The investment activities in Iran were made before the effective date of this section (i.e., April 12, 2012), the investment activities in Iran have not been expanded or renewed after the effective date of this section and the person has adopted, publicized and is implementing a formal plan to cease the investment activities in Iran and to refrain from engaging in any new investments in Iran: or
- (2) The City makes a determination that the goods or services are necessary for the City to perform its functions and that, absent such an exemption, the City would be unable to obtain the goods or services for which the contract is offered. Such determination shall be made in writing and shall be a public document.

**BIDDER'S CERTIFICATION OF COMPLIANCE WITH
IRAN DIVESTMENT ACT**

Pursuant to General Municipal Law §103-g, which generally prohibits the City from entering into contracts with persons engaged in investment activities in the energy sector of Iran, the bidder/proposer submits the following certification:

[Please Check One]

BIDDER'S CERTIFICATION

- ☐ By submission of this bid or proposal, each bidder/proposer and each person signing on behalf of any bidder/proposer 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, that each bidder/proposer is not on the list created pursuant to paragraph (b) of subdivision 3 of Section 165-a of the State Finance Law.
- ☐ I am unable to certify that my name and the name of the bidder/proposer does not appear on the list created pursuant to paragraph (b) of subdivision 3 of Section 165-a of the State Finance Law. I have attached a signed statement setting forth in detail why I cannot so certify.

Dated: _____, New York
_____, 20 ____

SIGNATURE

PRINTED NAME

TITLE

Sworn to before me this
_____ day of _____, 20 ____

Notary Public

Dated:

CITY OF NEW YORK

DIVISION OF LABOR SERVICES

CONSTRUCTION EMPLOYMENT REPORT

THIS PAGE INTENTIONALLY LEFT BLANK

The City of New York Department of Small Business Services
Division of Labor Services Contract Compliance Unit
110 William Street, New York, New York 10038
Phone: (212) 513 - 6323
Fax: (212) 618-8879

CONSTRUCTION EMPLOYMENT REPORT

GENERAL INFORMATION

1. Your contractual relationship in this contract is: Prime contractor____ Subcontractor____
- 1a. Are M/WBE goals attached to this project? Yes ____ No ____
2. Please check one of the following if your firm would like information on how to certify with the City of New York as a:
____ Minority Owned Business Enterprise ____ Locally based Business Enterprise
____ Women Owned Business Enterprise ____ Emerging Business Enterprise
- 2a. If you are certified as an **MBE, WBE, or LBE**, what city/state agency are you certified with?
____ Are you DBE certified? Yes ____ No ____
3. Please indicate if you would like assistance from SBS in identifying certified M/WBEs for contracting opportunities: Yes ____ No ____
4. Is this project subject to a project labor agreement? Yes ____ No ____

PART I: CONTRACTOR/SUBCONTRACTOR INFORMATION

5. _____
Employer Identification Number or Federal Tax I.D./ _____ Email Address _____
6. _____
Company Name _____
7. _____
Company Address and Zip Code _____
8. _____
Chief Operating Officer _____ Telephone Number _____
9. _____
Designated Equal Opportunity Compliance Officer _____ Telephone Number _____
(If same as Item #7, write "same")
10. _____
Name of Prime Contractor and Contact Person _____
(If same as Item #5, write "same")
11. Number of employees in your company: _____

12. Contract information:

- (a) _____ Contracting Agency (City Agency)
- (b) _____ Contract Amount
- (d) _____ Procurement Identification Number (PIN)
- (e) _____ Contract Registration Number (CT#)
- (f) _____ Projected Commencement Date
- (g) _____ Projected Completion Date

(h) Description and location of proposed contract:

13. Has your firm been reviewed by the Division of Labor Services (DLS) within the past 36 months and issued a Certificate of Approval? Yes___ No___

If yes, attach a copy of certificate.

14. Has DLS within the past month reviewed an Employment Report submission for your company and issued a Conditional Certificate of Approval? Yes___ No___

If yes, attach a copy of certificate.

NOTE: DLS WILL NOT ISSUE A CONTINUED CERTIFICATE OF APPROVAL IN CONNECTION WITH THIS CONTRACT UNLESS THE REQUIRED CORRECTIVE ACTIONS IN PRIOR CONDITIONAL CERTIFICATES OF APPROVAL HAVE BEEN TAKEN.

15. Has an Employment Report already been submitted for a different contract (not covered by this Employment Report) for which you have not yet received compliance certificate?
Yes___ No___ If yes,

Date submitted: _____
Agency to which submitted: _____
Name of Agency Person: _____
Contract No: _____
Telephone: _____

16. Has your company in the past 36 months been audited by the United States Department of Labor, Office of Federal Contract Compliance Programs (OFCCP)? Yes___ No___

If yes,

(a) Name and address of OFCCP office.

- (b) Was a Certificate of Equal Employment Compliance issued within the past 36 months?
Yes___ No___

If yes, attach a copy of such certificate.

- (c) Were any corrective actions required or agreed to? Yes___ No___

If yes, attach a copy of such requirements or agreements.

- (d) Were any deficiencies found? Yes___ No___

If yes, attach a copy of such findings.

17. Is your company or its affiliates a member or members of an employers' trade association which is responsible for negotiating collective bargaining agreements (CBA) which affect construction site hiring? Yes___ No___

If yes, attach a list of such associations and all applicable CBA's.

PART II: DOCUMENTS REQUIRED

18. For the following policies or practices, attach the relevant documents (e.g., printed booklets, brochures, manuals, memoranda, etc.). If the policy(ies) are unwritten, attach a full explanation of the practices. See instructions.

- ___ (a) Health benefit coverage/description(s) for all management, nonunion and union employees (whether company or union administered)
- ___ (b) Disability, life, other insurance coverage/description
- ___ (c) Employee Policy/Handbook
- ___ (d) Personnel Policy/Manual
- ___ (e) Supervisor's Policy/Manual
- ___ (f) Pension plan or 401k coverage/description for all management, nonunion and union employees, whether company or union administered
- ___ (g) Collective bargaining agreement(s).
- ___ (h) Employment Application(s)
- ___ (i) Employee evaluation policy/form(s).
- ___ (j) Does your firm have medical and/or non-medical (i.e. education, military, personal, pregnancy, child care) leave policy?

19. To comply with the Immigration Reform and Control Act of 1986 when and of whom does your firm require the completion of an I-9 Form?

- | | |
|--|--------------|
| (a) Prior to job offer | Yes___ No___ |
| (b) After a conditional job offer | Yes___ No___ |
| (c) After a job offer | Yes___ No___ |
| (d) Within the first three days on the job | Yes___ No___ |
| (e) To some applicants | Yes___ No___ |
| (f) To all applicants | Yes___ No___ |
| (g) To some employees | Yes___ No___ |
| (h) To all employees | Yes___ No___ |

20. Explain where and how completed I-9 Forms, with their supportive documentation, are maintained and made accessible.

21. Does your firm or any of its collective bargaining agreements require job applicants to take a medical examination? Yes___ No___

If yes, is the medical examination given:

- | | |
|-----------------------------------|--------------|
| (a) Prior to a job offer | Yes___ No___ |
| (b) After a conditional job offer | Yes___ No___ |
| (c) After a job offer | Yes___ No___ |
| (d) To all applicants | Yes___ No___ |
| (e) Only to some applicants | Yes___ No___ |

If yes, list for which applicants below and attach copies of all medical examination or questionnaire forms and instructions utilized for these examinations.

22. Do you have a written equal employment opportunity (EEO) policy? Yes___ No___

If yes, list the document(s) and page number(s) where these written policies are located.

23. Does the company have a current affirmative action plan(s) (AAP)

___ Minorities and Women
___ Individuals with handicaps
___ Other. Please specify _____

24. Does your firm or collective bargaining agreement(s) have an internal grievance procedure with respect to EEO complaints? Yes___ No___

If yes, please attach a copy of this policy.

If no, attach a report detailing your firm's unwritten procedure for handling EEO complaints.

25. Has any employee, within the past three years, filed a complaint pursuant to an internal grievance procedure or with any official of your firm with respect to equal employment opportunity? Yes___ No___

If yes, attach an internal complaint log. See instructions.

26. Has your firm, within the past three years, been named as a defendant (or respondent) in any administrative or judicial action where the complainant (plaintiff) alleged violation of any anti-discrimination or affirmative action laws? Yes___ No___

If yes, attach a log. See instructions.

27. Are there any jobs for which there are physical qualifications? Yes___ No___

If yes, list the job(s), submit a job description and state the reason(s) for the qualification(s).

28. Are there any jobs for which there are age, race, color, national origin, sex, creed, disability, marital status, sexual orientation, or citizenship qualifications? Yes___ No___

If yes, list the job(s), submit a job description and state the reason(s) for the qualification(s).

THIS PAGE INTENTIONALLY LEFT BLANK

SIGNATURE PAGE

I, (print name of authorized official signing) _____ hereby certify that the information submitted herewith is true and complete to the best of my knowledge and belief and submitted with the understanding that compliance with New York City's equal employment requirements, as contained in Chapter 56 of the City Charter, Executive Order No. 50 (1980), as amended, and the implementing Rules and Regulations, is a contractual obligation.

I also agree on behalf of the company to submit a certified copy of payroll records to the Division of Labor Services on a monthly basis.

Contractor's Name

Name of person who prepared this Employment Report

Title

Name of official authorized to sign on behalf of the contractor

Title

Telephone Number

Signature of authorized official

Date

If contractors are found to be underutilizing minorities and females in any given trade based on Chapter 56 Section 3H, the Division of Labor Services reserves the right to request the contractor's workforce data and to implement an employment program.

Contractors who fail to comply with the above mentioned requirements or are found to be in noncompliance may be subject to the withholding of final payment.

Willful or fraudulent falsifications of any data or information submitted herewith may result in the termination of the contract between the City and the bidder or contractor and in disapproval of future contracts for a period of up to five years. Further, such falsification may result in civil and/or criminal prosecution.

To the extent permitted by law and consistent with the proper discharge of DLS' responsibilities under Charter Chapter 56 of the City Charter and Executive Order No. 50 (1980) and the implementing Rules and Regulations, all information provided by a contractor to DLS shall be confidential.

Only original signatures accepted.

Sworn to before me this _____ day of _____ 20 _____

Notary Public

Authorized Signature

Date

THIS PAGE INTENTIONALLY LEFT BLANK

FMS ID: PV467BRAC-R



**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/buildnyc

Contract for Furnishing all Labor and Material Necessary and Required for:

CONTRACT NO. 1 GENERAL CONSTRUCTION WORK

Bronx River Art Center Renovation

LOCATION: 1087 East Tremont Avenue
BOROUGH: Bronx 10460
CITY OF NEW YORK

Contractor

Dated _____, 20____

Entered in the Comptroller's Office

First Assistant Bookkeeper

Dated _____, 20____





PROJECT ID:

PV467BRAC-R

**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/buildnyc

LAW

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

Bronx River Art Center Renovation

LOCATION:
BOROUGH:
CITY OF NEW YORK

1087 East Tremont Avenue
Bronx 10460

CONTRACT NO. 1

GENERAL CONSTRUCTION WORK

Department of Cultural Affairs

Sage and Coombe Architects



Date: February 8, 2013

3-023



**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/buildnyc

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



NOTICE:

THIS CONTRACT IS NOT SUBJECT TO THE REQUIREMENTS OF THE WICKS LAW FOR SEPARATE PRIME CONTRACTORS

This contract is subject to a Project Labor Agreement ("PLA"). In accordance with the Labor Law, 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. However, the Contract Documents for this Project (General Conditions, Drawings and Specifications) were prepared as if the requirements of the Wicks Law for separate prime contractors did apply. To correct this situation, the bidder is advised that the Contract Documents are revised as set forth below.

- (A) Delete any and all references to separate responsibilities, separate specifications, separate drawings and/or separate contracts for the four subdivisions of the work listed below:
- General Construction Work (Contract No. 1)
 - Plumbing Work (Contract No. 2)
 - HVAC & Fire Protection Work (Contract No. 3)
 - Electrical Work (Contract No. 4)
- (B) Revise all such references to indicate that:
- The Project consists of a single contract, the Contract for General Construction Work.
 - All responsibilities and obligations in the Contract Documents assigned to the separate Contractors for the four subdivisions of the work listed above are the responsibility of the Contractor 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, including all responsibilities and obligations assigned to the separate Contractors for the four subdivisions of the work listed above.
- (C) Revise any and all references to Contracts Nos. 2, 3 and 4 to refer to Contract No. 1.
- (D) Revise the specifications for plumbing work to require Contractor for General Construction Work to engage a Licensed Plumber to perform the required plumbing work.
- (E) Revise the specifications for electrical work to require Contractor for General Construction Work to engage a Licensed Electrician to perform the required electrical work.

NOTICE:

THIS CONTRACT IS SUBJECT TO A 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 the attached Letter of Assent prior to award. 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. Contractor will also be required to have all subcontractors of all tiers execute the attached Letter of Assent prior to such subcontractors performing any work on the Project. 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. All bidders should carefully read the entire PLA that governs this Contract.

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 work, ten hours per day on straight time at the commencement of the job, PLA Article 12, section 1, 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.

In addition to the various provisions regarding work rules, Contractors should take special note of the requirement that Contractors and Subcontractors make payments to designated employee benefit funds. See PLA Article 11, Section 2. The PLA also contains provisions for what occurs when a contractor or a subcontractor fails to make required payments into the benefit funds, including potentially the direct payment by the City to the benefit fund of monies owed and corresponding withholding of payments to the Contractor. See PLA Article 11, Section 2. The City strongly advises Contractors to read these provisions carefully and to include appropriate provisions in subcontracts addressing these possibilities.

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, 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 directive.

If this Contract is subject to the Minority-Owned and Women-Owned Business Enterprise ("M/WBE") program created by Local Law 129, the specific requirements of M/WBE participation for this Contract are set forth in Schedule B entitled the "Subcontractor Utilization Plan", and are detailed in a separate Notice to Prospective Contractors included with this bid package. If such requirements are included with this Contract, the City strongly advises Contractors to read those provisions, as well as PLA Article 4, Section 2(C), carefully. A list of M/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) 513-6356, or by visiting or writing DSBS at 110 William St., New York, New York, 10038, 7th 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.

The local collective bargaining agreements (CBAs) that are incorporated into the PLA as PLA Schedule A Agreements are available on computer disk from the Department's 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.

A contact list for the participating unions is set forth after the FAQs.

Below are answers to frequently asked questions (FAQs) about this PLA:

Q1. Does a contractor need to be signatory with the unions in the NYC Building and Construction Trades Council 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.

Q2. 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.

Q3. Does the PLA affect the subcontractors that a bidder may utilize on the project?

A. Subject to the Department'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 and agrees to the terms of the PLA.

Q4. 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. Subcontractors, however, will be required to sign the letter of Assent prior to being approved by the Department.

Q5. 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. See PLA Article 4. However, contractors and subcontractors may continue to use up to 12% of their existing, qualifying labor force for this work, in accordance with the terms of PLA Article 4, Section 2B. Certified MWBEs for which participation goals are set pursuant to NYC Administrative Code §6-129 that are not signatory to any Schedule A CBAs may use their existing employees for the 2nd, 4th, 6th and 8th employee needed on the job if their contracts are valued at or under \$500,000. For contracts valued at above \$500,000 but under \$1,000,000, such certified MWBEs may use their own employees for the 2nd, 5th and 8th employees needed on the job in accordance with the provisions of PLA Article 4, Section 2C. If additional workers are needed by these MWBEs, the additional workers will be referred to the contractor from the signatory local unions subject to the contractor's right to meet 12% of the additional needs with its existing, qualifying employees.

Q6. Must the City set MWBE participation goals for the particular project or contract in order for a certified MWBE to utilize the provisions of PLA Article 4, Section 2C?

A. No. PLA Article 4, Section 2(C) specifies what categories of MWBEs are eligible to take advantage of this provision (i.e., those MWBEs for which the City is authorized to set participation goals under §6-129). For purposes of 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 projects receives State funding and therefore is subject to the requirements of Article 15-A of the Executive Law.

Q7. 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 collective bargaining agreements (local CBAs) where such provisions exist and/or in accordance with the provisions of PLA Article 4, Section 2.

Q8. 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. Non-union employees working under the PLA are subject to the union security provisions (i.e., union dues/agency shop fees) of the local CBAs while on the project. These employees will be enrolled in the appropriate benefit plans and earn credit toward various union benefit programs. See PLA Article 4, Section 6 and Article 11.

Q9. Are all contractors and subcontractors working under the PLA, including non-union contractors and contractors signatory to collective bargaining agreements with locals other than those that are signatories to the PLA, required to make contributions to designated employee benefit funds?

A. Contractors and subcontractors working under the PLA will be required to contribute on behalf of all employees covered by the PLA to established jointly trustee employee benefit funds designated in the Schedule A CBAs and required to be paid on public works under any applicable prevailing wage law. See PLA Article 11, Section 2. 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 C.

Q10. 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. The City strongly advises Contractors to read these provisions carefully and to include appropriate provisions in subcontracts addressing these possibilities.

Q11. Does signing on to the PLA satisfy the Apprenticeship 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.

Q12. Does the PLA provide a standard work day 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. 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 project. 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).

Q13. Does the PLA create a common holiday schedule for all the signatory trades?

A. Yes, the PLA recognizes eight (8) common holidays. See PLA Article 12, Section 4.

Q14. Does the PLA provide for a standard policy for 'shift work' across all signatory trades?

A. Yes, second and third shifts may be worked with a standard 5% premium pay. In addition, a day shift does not have to be scheduled in order to work the second and third shifts at the 1.05 hourly pay rate. See PLA Article 12, Section 3.

Q15. 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 the 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.

Q16. 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 trades CBA.

Q17. 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.

Q18. Does the PLA contain special provisions for the manning 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.

Q19. 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 day. See PLA Article 12, Sections 6 and 8.

Q20. Should a local collective bargaining agreement [local CBA] 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.

Q21. 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.

Q22. 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 Project Labor Agreements 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.

Q23. 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.

Q24. 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. See PLA Article 10. A copy of the NY Plan is available upon request from the Department. 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, Section 3.

THIS PAGE INTENTIONALLY LEFT BLANK

CONTACT INFORMATION FOR LOCAL UNIONS

BOILER MAKERS LOCAL NO. 5

24 Van Siclen Avenue
Floral Park, NY 11001
Phone: (516) 326-2500
Fax: (516) 326-3435
Thomas Klein, Bus. Mgr.
boilermakers5@optonline.net

BLASTERS & DRILLERS LOCAL NO. 29

43-12 Ditmars Blvd.
Astoria, NY, 11105
Phone: (718) 278-5800
Thomas Russo, bus mgr.

BRICKLAYERS LOCAL NO. 1

Santo Lanzafame (718) 392-0525

BUILDING TRADES

71 West 23rd Street, Suite 501
New York, NY 10010
Phone: (212) 647-0700
Fax: (212) 647-0705
John Barnett, Chairman

CARPENTERS DISTRICT COUNCIL

395 Hudson Street
New York, New York 10014
Phone: (212) 366-7500
Fax: (212) 675-3140
Michael J. Forde, Executive Secy Treas.
Peter Thomassen, President
Denis Sheil, V.P.
Ronald Rawald, D.C. Rep.
carpmik@aol.com

CEMENT MASONS NO. 780

150-42 12th Avenue
Whitestone, NY 11357
Phone: (718) 357-3750
Fax: (718) 357-2057
Angelo Scagnelli, Bus. Mgr.
Paul M. Mantia, President
Angelolocal780@yahoo.com

CONCRETE WORKERS DISTRICT COUNCIL NO. 16

29-18 35th Avenue
Long Island City, NY 11106
Phone: (718) 392-5077
Fax: (718) 392-5087
Alex Castaldi, Pres. Bus. Mgr.
Ccwdc16@yahoo.com

DERRICKMEN AND RIGGERS CONCRETE WORKERS

25-19 43rd Avenue
Long Island City, NY 11101
Phone: (718) 361-6534

Fax: (718) 361-6584
Joseph McDonald, Bus. Agent
joemac197@aol.com

DRYWALL TAPERS 1974

265 West 14th Street
New York, NY 10011
Phone: (212) 242-8500
Fax: (212) 242-2356
Joseph Giordano, Bus. Mgr.
Salvatore Marsala, Org.
Maurice Maynard, Org.
Ellior Santiago, Org.
Vincent Calderone, Org.
Ann Juliano Union Sec.
Local1974@aol.com

ELECTRICAL LOCAL NO. 3

158-11 Harry Van Arsdale, Jr. Avenue
Flushing, NY 113656
Phone: (718) 591-4000
Fax: (718) 380-8998
Christopher Erikson, Bus. Mgr.
John E. Marchell, President
Raymond Melville, Asst. Bus. Mgr. Construction
Paul Ryan, Asst. Bus. Mgr. Westchester/Fairfield
Luis Restrepo, Asst. Bus. Mgr.
Mark G. Hansen, Bus. Rep.
Elliot Hecht, Bus. Rep.
Raymond Kitson, Bus. Rep.
Austin McCann, Bus. Rep.
Robert Olenick, Bus. Rep.
Michael O'Neill, Bus. Rep.
Joseph Santigate, Bus. Rep.
Louis Sciara, Bus. Rep.
Lance Van Arsdale, Asst. Bus. Maintenance Division
Ray West, Bus. Rep.
mail@local3ibew.org

ELEVATOR CONSTRUCTORS NO. 1

47-24 27th Avenue
Long Island City, NY 11101
Phone: (718) 767-7004
Fax: (718) 767-6730
Lenny Legotte, Pres. Bus. Mgr.
Thomas Moore, Bus. Agent
Gary Riefenhauser, Bus. Agent
Fred McCourt, Bus. Agent
Robert Stork, Bus. Agent
llegotte@localoneiuec.com
snoble@localoneiuec.com

ENGINEERS NO. ENGINEERS LOCAL UNION NO. 14

141-57 Northern Boulevard
Flushing, NY 11354
Phone: (718) 939-0600
Fax: (718) 939-3131
Edwin Christian, Pres. Bus. Mgr.

Christopher Confrey, Bus. Rep. Rec Sec.
John R. Powers, Bus. Rep. Treas.
engineers@iuoelocal14.com

ENGINEERS NO. 15, 15A, 15B, 15C, 15D

265 West 14th Street
New York, NY 10011
Phone: (212) 929-5327-8-9
Fax: (212) 206-0357
James T. Callahan, Pres. & Bus. Mgr.
Robert G. Shaw, Bus. Rep. & V.P.
Charles Gambino, Bus. Rep., Fin. Sec.
Brian S. Kelly, Bus. Rep. & Rec. Sec.
Daniel Schneider, Bus. Rep. & Treasurer
Gregg Nolan, Bus. Rep.
Christopher Thomas, Bus. Rep.
Bruce Murphy, Director of Training

ENGINEERS NO. 30

115-06 Myrtle Avenue
Richmond Hill, NY 11418
Phone: (718) 847-8484
Fax: (718) 850-0524
John T. Ahern, Bus. Mgr.

ENGINEERS No. 94

331-337 West 44th Street
New York, NY 10036
Phone: (212) 245-7040 Fax: (212) 245-7886
Kuba Brown, Bus. Mgr. & President
kubabrown@local94.com

GLAZERS NO. 1281

45 West 14th Street
New York, NY 10011
Phone: (212) 924-5200
Fax: (212) 255-1151
William Elfeld, Bus. Rep.

HEAT & FROST INSULATORS AND ASBESTOS WORKERS LOCAL UNION NO. 12

25-19 43rd Avenue
Long Island City, NY 11101
Phone: (718) 784-3456
Fax: (718) 784-8357
Joseph Lapinski, Bus. Agent
Nick Grgas, Bus. Agent
Matthew Aracick, Fin. Sec.
John Killard, President
Dennis Ippolito, Bus. Mgr.
matty@insulatorslocal12.com
dennis@insulators.org

HEAT FROST INSULATORS LOCAL UNION NO. 12A

2110 Newton Avenue
Astoria, NY 11102
Phone: (718) 937-3203
Fax: (718) 482-8722
Francisco Vega, Bus. Mgr.

IRON WORKERS DISTRICT

505 White Plains Road, Suite 200
Tarrytown, NY 10591
Phone: (914) 332-4430
Fax: (914) 332-4431
Edward J. Walsh, Pres.
ironworkdc@aol.com

IRON WORKERS NO. 40

451 Park Avenue South
New York, NY 10016
Phone: (212) 889-1320
Fax: (212) 779-3267
Robert Walsh, Bus. Mgr. Fin. Sec.
Daniel Doyle, Bus. Rep. V.P.
Kevin O'Rourke, Pres. Bus. Agent

IRON WORKERS NO. 361

89-19 97TH Avenue
Ozone Park, NY 11416
Phone: (718) 332-1016-17
Fax: (718) 322-1053
Matthew Chartrand, Pres. Bus. Agent
Richard O'Kane, Bus. Mgr. Fin. Sec.
Thomas Seaman, President
Anthony DeBlaisie, Bus. Agent, V.P.
John Delaney, Jr., Rec. Sec.
unionhall@361.com

LABORERS LOCAL NO. 78 ASBESTOS & LEAD ABATEMENT

30 Cliff Street
New York, New York 10038-2825
Phone: (212) 227-4805
Fax: (212) 406-1800
Kazik Prosniewski, Pres.
Edison Severino, Bus. Mgr.
Pawel Gruchacz, Sec. Treas.
Local78dispatchers@gmail.com

LABORERS, CONSTRUCTION AND GENERAL BUILDING NO. 79

520 8th Avenue
New York, NY 10018
Phone: (212) 465-7900
Fax: (212) 465-7903
Kenneth Brancaccio, President
John Delgado, Bus. Mgr.
George Zecca, Bus. Mgr.
John Norbury, V.P. & Bus. Agent
Chas Rynkiewicz, Organizer, Mk Dev.
Eugene Sparano, Organizer Mkt. Dev.
John Modica, Bus. Agent
Joseph Cangelosi, Bus. Agent
Kenny Robinson, Bus. Agent
James Haggerty, Bus. Agent
Carl Tully, Bus. Agent
Jose Andino, Bus. Agent
Edward Medina, Bus. Agent

Luis Pereria, Bus Agent
Noe Duran, Bus. Agent
Timothy Campbell, Bus. Agent
John Wund, Agent, Organizer
79@laborerslocal.org

LABORERS NO. 731

34-11/19 35th Avenue
Astoria, NY 11106
(718) 706-0720
Joseph D'Amato, Bus. Mgr.

LATHERS METAL LOCAL NO. 46

1322 Third Avenue
New York, NY 10021
Phone: (212) 737-0500
Fax: (212) 249-1226
Robert Ledwith, Bus. Mgr.
Terence Moore, Bus. Agent
Kenneth Allen, Bus. Agent
Fred LeMoine Jr., Bus. Agent
Kevin Kelly, Bus. Agent

MASON TENDERS DIST. COUNCIL

520 8th Avenue
New York, NY 10018
Phone: (212) 452-9400
Fax: (212) 452-9499
Robert Bonanza, Bus. Mgr.
David Bolger, Field Rep.

METAL POLISHERS LOCAL UNION NO. 8A

36-18 33rd Street 2nd Fl.
Long Island City, 11106
Phone: (718) 361-1770
Fax: (718) 361-1934
Hector Lopez, Bus. Mgr., Pres.

METAL TRADES DIVISION

Kevin Connelly, Bus. Agent
21-42 44th Drive

MILLWRIGHT AND MACHINERY ERECTORS LOCAL NO. 740

89-07 Atlantic Avenue
Woodhavaen, NY 11412
Phone: (718) 849-3636
Fax: (718) 849-0070
Robert Seeger, Bus. Mgr.

ORNAMENTAL IRON WORKERS NO. 580

501 West 42nd Street
New York, NY 10036
Phone: (212) 594-1662
Fax: (212) 564-2748
Dennis Lusardi, Bus. Mgr.
James Mahoney, Bus. Agent
Robert Benesh, Bus. Agent
Dennis Milton, Bus. Agent

Peter Creegan, Bus. Agent
dlusardi@local-580.com

PAINTERS DISTRICT COUNCIL NO. 9

45 West 14th Street
New York, NY 10011
Phone: (212) 255-2950
Fax: (212) 255-1151
William Elfeld, President
Gerard O'Brien, Bus. Rep.
Greg Coords, Bus. Rep.
Richard Small, Bus. Rep.
Jose Torent, Bus. Rep.
Raul Rendon, Bus. Rep.
Paul Belliveau, Bus. Rep.
Joseph Ramaglia, Bus. Mgr.
Anthony Buscema, Bus. Rep.
James Barnett, Bus. Rep.
Angelo Serse, Bus. Rep.
Jack Kittle, Political Dir.
Gus Diamantas, Training Director
John Barrett, Bus. Rep.

PAINTERS STRUCTURAL STEEL NO. 806

40 West 27th Street
New York, New York 10001
Phone: (212) 447-1838, 0149
Fax: (212) 545-8386
Angelo Serse, Bus. Mgr.

PAVERS & ROAD BUILDERS DISTRICT COUNCIL NO. 1

136-25 37th Avenue, Suite 502
Flushing, NY 11354
Phone: (718) 779-8850
Fax: (718) 779-8857
Keith Loscalzo, Bus. Mgr.
Vincent Masino, Trustee
Lowell Barton, Bus. Agent
Francisco Fernandez, Bus. Agent
Joao Teixeira, Bus. Agent
Bonaventura Valerio, Bus. Agent
Joseph Sarro, Bus. Agent

PLASTERS LOCAL UNION NO. 262

2241 Conner Street
Bronx, NY 10466
Phone: (718) 547-5440
Fax: (718) 547-5435
John Sweeney, Int'l Rep.
mventura@opcmialocal262.com

PLUMBERS NO. 1

158-29 Bross Bay Boulevard
Howard Beach, NY 11414
Phone: (718) 738-7500
Fax: (718) 835-0896
George Reilly, Bus. Mgr.
Daniel Lucarelli, Bus. Agent

Kevin Brady Sr., Bus. Agent
Donald Doherty Jr. Bus. Agent at Large
Dudley Kinsley, Bus. Agent
Michael Apuzzo, Bus. Agent
John Feeney Jr., Bus. Agent
Paul O'conner, Bus. Agent
Anthony Russini, Bus. Agent
John Murphy, Fin. Sec. Treasurer
Fred Delligatti, Bus. Agent
Thomas Kemps, Bus. Agent
plulny@aol.com

PRIVATE SANITATION LOCAL NO. 813

45-18 Court Sq., Suite 600
Long Island City, NY 11101
Phone: (718) 937-7010
Fax: (718) 937-7003
Anthony Marino, President

ROOFERS & WATERPROOFERS NO. 8

467 Dean Street
Brooklyn, NY 11217
Phone: (718) 857-3500
Fax (718) 398-8359
Thomas Pedrick, Trustee & Int'l V.P.
Nicolas Siciliano, Bus. Agent

SHEET METAL WORKERS LOCAL NO. 28

MANHATTAN OFFICE
500 Greenwich Street
New York, NY 10013
Phone: (212) 226-941-7700
Fax: (212) 226-0304
Brian McBreaty, Bus. Agent
Richard Knice, Fin. Sec-Treas.
Michael Belluzzi, Bus. Mgr. & Pres.
Kevin McPike, Bus. Agent
Daniel Fox Jr., Bus. Agent
Rick Buckheit, Bus. Agent
Robert Rotolo, Bus. Mgr.
joanne@local28union.com

SHEET METAL WORKERS LOCAL 137

21-42 44th Drive
Long Island City, NY 11101
Phone: (718)) 937-4514
Fax: (718) 937-4113
Paul Collins Jr.
Dante Dano, Agent

STEAMFITTERS LOCAL UNION NO. 638

32-32 48th Avenue
Long Island City, NY 11101
Phone: (718) 392-3420
Fax: (718) 784-7285
John Torpey, Pres.-Fax: (718) 372-5340
James Elder, Sec. Treasurer
John Enright, Bus. Agent

John O'Connell, Bus. Agent
Richard Roberts, Bus. Agent At-Large
Patrick Dolan Jr., Bus. Agent
Brian Wangerman, Bus. Agent
Robert Egan Jr., Bus. Agent
Vincent Curran Jr., Bus. Agent
Patrick Daly, Bus. Agent
Raymond Dean Jr., Bus. Agent
Scott Roche, Bus. Agent
Patrick Norton, Bus. Agent
Robert Bartels, Jr. Bus. Agent
Christopher P. Sheeran, Bus. Agent
bpetriccione@steamfitters638.org
rroberts@steamfitters638.org

TEAMSTERS LOCAL UNION 282

2500 Marcus Avenue
Lake Success, NY 11042
Phone: (516) 488-2822
Fax: (516) 488-4895
Thomas Gesualdi
Kpalmeri282@yahoo.com

TEAMSTERS LOCAL UNION 814

33-01 38TH Avenue
Long Island City, NY 11101
Phone: (718) 392-4510
Fax: (718) 361-9610
George Daniello, Pres., Bus. Mgr.
team814@hotmail.com

TILE, MARBLE & TERRAZO B.A.C. LOCAL UNION 7

45-34 Court Square
Long Island City, NY 11101
Phone: (718) 786-7648
Fax: (718) 472-2370
Thomas Lane, President Bus. Mgr.
William Hill, Bus. Agent
Blaise Toneatto, Bus. Agent
Christopher Guy, Sec. Treasuer
Ernesto Jimenez, Bus. Agent
Joseph Andriano, Bus. Agent
Ronald Nicastrì, Bus. Agent
James Ghan, Bus. Agent
tlane@baclocal7.com

TIMBERMEN LOCAL 1536

395 Hudson Street, 8th Floor
New York, NY 10014
Phone: (212) 366-7500
Samuel Bailey, Bus. Mgr.

NYC AGENCY RENOVATION & REHAB OF CITY OWNED BUILDINGS/STRUCTURES

PROJECT LABOR AGREEMENT
COVERING SPECIFIED
RENOVATION & REHABILITATION
OF CITY OWNED BUILDINGS AND STRUCTURES

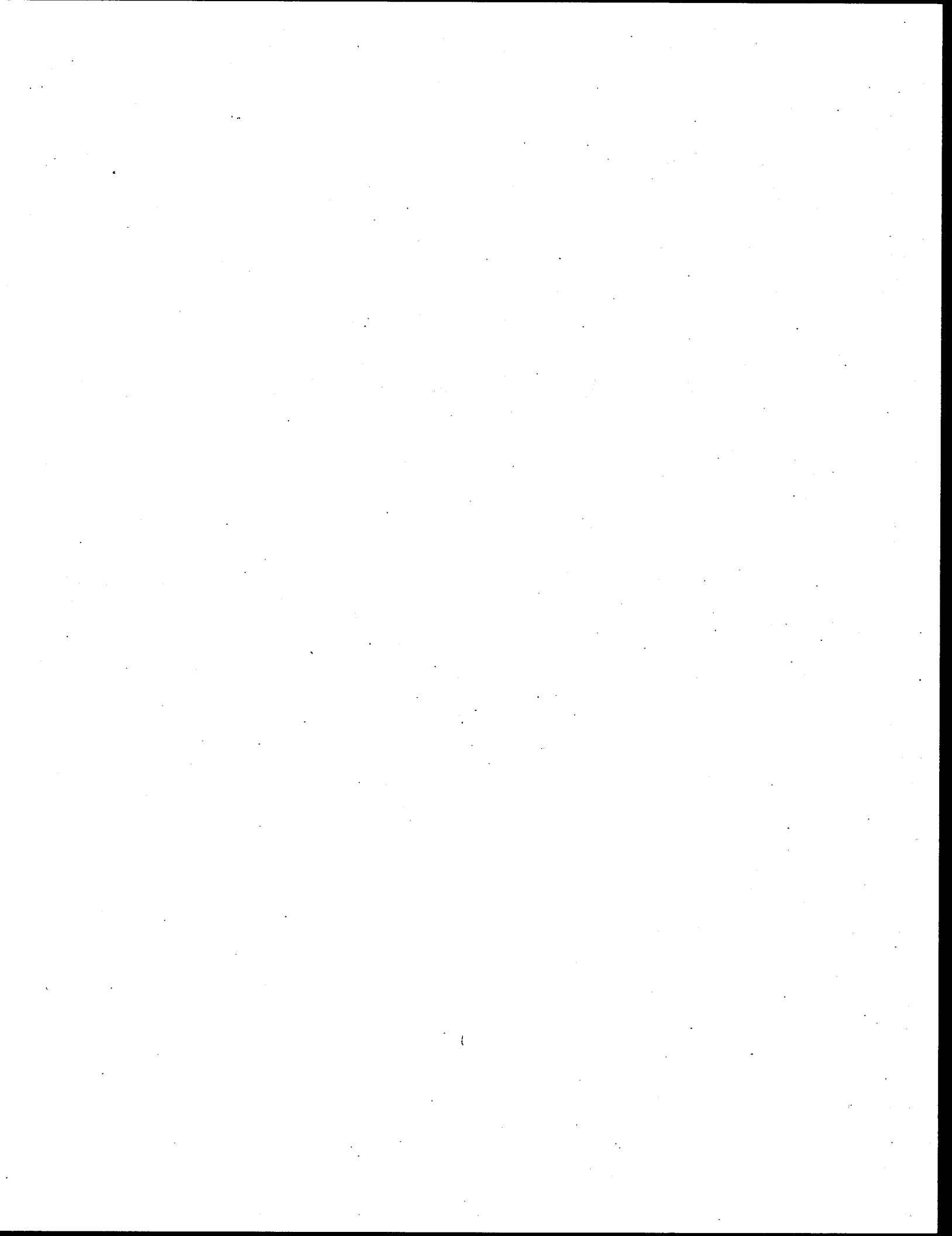


TABLE OF CONTENTS

	PAGE
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.....	3
SECTION 3. ENTITIES BOUND & ADMINISTRATION OF AGREEMENT	3
SECTION 4. SUPREMACY CLAUSE	4
SECTION 5. LIABILITY	4
SECTION 6. THE AGENCY.....	5
SECTION 7. AVAILABILITY AND APPLICABILITY TO ALL SUCCESSFUL BIDDERS	5
SECTION 8. SUBCONTRACTING	5
ARTICLE 3-SCOPE OF THE AGREEMENT.....	5
SECTION 1. WORK COVERED.....	5
SECTION 2. TIME LIMITATIONS	7
SECTION 3. EXCLUDED EMPLOYEES	7
SECTION 4. NON-APPLICATION TO CERTAIN ENTITIES.....	9
ARTICLE 4- UNION RECOGNITION AND EMPLOYMENT.....	9
SECTION 1. PRE-HIRE RECOGNITION	9

NYC AGENCY RENOVATION & REHAB CITY OWNED BUILDINGS/STRUCTURES

SECTION 2. UNION REFERRAL	9
SECTION 3. NON-DISCRIMINATION IN REFERRALS	11
SECTION 4: MINORITY AND FEMALE REFERRALS	12
SECTION 5. CROSS AND QUALIFIED REFERRALS.....	12
SECTION 6. UNION DUES	12
SECTION 7. CRAFT FOREPERSONS AND GENERAL FOREPERSONS	13
ARTICLE 5- UNION REPRESENTATION	13
SECTION 1. LOCAL UNION REPRESENTATIVE	13
SECTION 2. STEWARDS.....	13
SECTION 3. LAYOFF OF A STEWARD.....	14
ARTICLE 6- MANAGEMENT'S RIGHTS	14
SECTION 1. RESERVATION OF RIGHTS.....	14
SECTION 2. MATERIALS, METHODS & EQUIPMENT.....	15
ARTICLE 7- WORK STOPPAGES AND LOCKOUTS.....	16
SECTION 1. NO STRIKES-NO LOCK OUT	16
SECTION 2. DISCHARGE FOR VIOLATION	16
SECTION 3. NOTIFICATION.....	16
SECTION 4. EXPEDITED ARBITRATION	17
SECTION 5. ARBITRATION OF DISCHARGES FOR VIOLATION	19
ARTICLE 8 - LABOR MANAGEMENT COMMITTEE	19
SECTION 1. SUBJECTS.....	19

NYC AGENCY RENOVATION & REHAB CITY OWNED BUILDINGS/STRUCTURES

SECTION 2. COMPOSITION.....	19
ARTICLE 9- GRIEVANCE & ARBITRATION PROCEDURE	19
SECTION 1. PROCEDURE FOR RESOLUTION OF GRIEVANCES	20
SECTION 2. LIMITATION AS TO RETROACTIVITY.....	22
SECTION 3. PARTICIPATION BY AGENCY AND/OR CONSTRUCTION MANAGER.....	22
ARTICLE 10 - JURISDICTIONAL DISPUTES.....	22
SECTION 1. NO DISRUPTIONS.....	22
SECTION 2. ASSIGNMENT	22
SECTION 3. NO INTERFERENCE WITH WORK.....	22
ARTICLE 11 - WAGES AND BENEFITS.....	23
SECTION 1. CLASSIFICATION AND BASE HOURLY RATE	23
SECTION 2. EMPLOYEE BENEFITS.....	23
ARTICLE 12- HOURS OF WORK, PREMIUM PAYMENTS, SHIFTS AND HOLIDAYS.....	26
SECTION 1. WORK WEEK AND WORK DAY	26
SECTION 2. OVERTIME	27
SECTION 3. SHIFTS	27
SECTION 4. HOLIDAYS	28
SECTION 5. SATURDAY MAKE-UP DAYS.....	28
SECTION 6. REPORTING PAY.....	29
SECTION 7. PAYMENT OF WAGES.....	30

NYC AGENCY RENOVATION & REHAB CITY OWNED BUILDINGS/STRUCTURES

SECTION 8. EMERGENCY WORK SUSPENSION	30
SECTION 9. INJURY/DISABILITY	30
SECTION 10. TIME KEEPING	30
SECTION 11. MEAL PERIOD	30
SECTION 12. BREAK PERIODS	31
ARTICLE 13 - APPRENTICES	31
SECTION 1. RATIOS	31
ARTICLE 14-SAFETY PROTECTION OF PERSON AND PROPERTY	31
SECTION 1. SAFETY REQUIREMENTS	31
SECTION 2. CONTRACTOR RULES	32
SECTION 3. INSPECTIONS	32
ARTICLE 15 - TEMPORARY SERVICES	32
ARTICLE 16 - NO DISCRIMINATION.....	33
SECTION 1. COOPERATIVE EFFORTS	33
SECTION 2. LANGUAGE OF AGREEMENT	33
ARTICLE 17- GENERAL TERMS	33
SECTION 1. PROJECT RULES	33
SECTION 2. TOOLS OF THE TRADE.....	34
SECTION 3. SUPERVISION.....	34
SECTION 4. TRAVEL ALLOWANCES.....	34
SECTION 5. FULL WORK DAY	34

NYC AGENCY RENOVATION & REHAB CITY OWNED BUILDINGS/STRUCTURES

SECTION 6. COOPERATION AND WAIVER	34
ARTICLE 18. SAVINGS AND SEPARABILITY	35
SECTION 1. THIS AGREEMENT	35
SECTION 2. THE BID SPECIFICATIONS	36
SECTION 3. NON-LIABILITY	36
SECTION 4. NON-WAIVER.....	36
ARTICLE 19 - FUTURE CHANGES IN SCHEDULE A AREA CONTRACTS ...	37
SECTION 1. CHANGES TO AREA CONTRACTS.....	37
SECTION 2. LABOR DISPUTES DURING AREA CONTRACT NEGOTIATIONS	37
ARTICLE 20 - WORKERS' COMPENSATION ADR.....	37
SECTION 1.....	37
ARTICLE 21 - HELMETS TO HARDHATS.....	38
Section 1.....	38
Section 2.....	38
Project Labor Agreement - - Letter of Assent.....	45
New York City Building and Construction Trades Council Standards of Excellence.....	46

**PROJECT LABOR AGREEMENT COVERING SPECIFIED
RENOVATION & REHABILITATION OF NEW YORK CITY OWNED
FACILITIES & STRUCTURES**

ARTICLE 1 - PREAMBLE

WHEREAS, the City of New York desires to provide for the cost efficient, safe, quality, and timely completion of certain rehabilitation and renovation work ("Program Work," as defined in Article 3) for Fiscal Years 2010 - 2014 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 the 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;

NYC AGENCY RENOVATION & REHAB CITY OWNED BUILDINGS/STRUCTURES

- (8) ensuring a reliable source of skilled and experienced labor; and
- (9) 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, on behalf of itself and 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") (on behalf of itself) and the signatory affiliated Local Union's ("Unions" or "Local Unions"). The Council and each signatory Local Union hereby warrants and represents that it has been duly authorized to enter into this Agreement.

ARTICLE 2 - GENERAL CONDITIONS

SECTION 1. DEFINITIONS

Throughout this Agreement, the various Union parties including the Building and Construction Trades Council of Greater New York and Vicinity and its participating affiliated Local Unions, are referred to singularly and collectively as "Union(s)" or "Local Unions"; the term "Contractor(s)" shall include any Construction Manager, General Contractor and all other

NYC AGENCY RENOVATION & REHAB CITY OWNED BUILDINGS/STRUCTURES

contractors, and subcontractors of all tiers engaged in Program Work within the scope of this Agreement as defined in Article 3; "Agency" means the following New York City agencies: the Department for the Aging (DFTA), Administration for Children's Services (ACS), Department of Citywide Administrative Services (DCAS), Department of Corrections (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); the New York City Agency that awards a particular contract subject to this Agreement may be referred to hereafter as the "Agency"; when an Agency acts as 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; the Building and Construction Trades Council of Greater New York and Vicinity is referred to as the "Council"; and the work covered by this Agreement (as defined in Article 3) is referred to as "Program Work."

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 his 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

NYC AGENCY RENOVATION & REHAB CITY OWNED BUILDINGS/STRUCTURES

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.

SECTION 4. SUPREMACY CLAUSE

This Agreement, together with the local Collective Bargaining Agreements appended hereto as Schedule A, represents the complete understanding of all signatories and supersedes any national agreement, local agreement or other collective bargaining agreement of any type which would otherwise apply to this Program Work, in whole or in part, except that Program Work which falls within the jurisdiction of the Operating Engineers Locals 14 and 15 and/or the Teamsters Local 282 will be performed under the terms and conditions set out in the Schedule A agreements of Operating Engineers Locals 14 and 15 and Teamsters Local 282. Subject to the foregoing, where a subject covered by the provisions of this Agreement is also covered by a Schedule A, the provisions of this 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 on this Program Work unless endorsed in writing by the Construction Manager or such other designee as may be designated by the Agency.

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 Program.

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

NYC AGENCY RENOVATION & REHAB CITY OWNED BUILDINGS/STRUCTURES

Program Work shall be limited to designated 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 rehabilitation and renovation work performed for an Agency on City-owned property under contracts let prior to June 30, 2014. Subject to the foregoing, and the exclusions below, such Program Work shall mean any and all contracts that predominantly involve the renovation, repair, alteration, rehabilitation or expansion of an existing City-owned building or structure within the five boroughs of New York 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. This Program Work shall also include JOCS contracts, demolition work, site work, asbestos and lead abatement, painting services, carpentry services, and carpet removal and installation, to the extent incidental to such building rehabilitation of City-owned buildings or structures.

It is understood that Program Work does not include, and this Project Labor Agreement shall not apply to, any other work, including:

1. 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 June 30, 2014;
2. Contracts procured on an emergency basis;
3. Small purchases (purchases not more than \$100,000) awarded pursuant to New York City Charter §314, New York City Charter § 316 and New York City Procurement Policy Board Rules §3-08;
4. Contracts for work on streets and bridges and for the closing or environmental remediation of landfills;

NYC AGENCY RENOVATION & REHAB CITY OWNED BUILDINGS/STRUCTURES

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

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

7. 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; and

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

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 June 30, 2014, 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 (excluding general and forepersons

NYC AGENCY RENOVATION & REHAB CITY OWNED BUILDINGS/STRUCTURES

specifically covered by a craft's Schedule A), 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 Agency, New York City, or any other municipal or State agency, authority or entity, or employees of any other public employer, even though working on the Program 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 agreement;

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 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 firm; and

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.

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 (including in its capacity as Construction Manager) 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

NYC AGENCY RENOVATION & REHAB CITY OWNED BUILDINGS/STRUCTURES

A. The Contractors agree to employ and hire craft employees for Program Work covered by this Agreement through the job referral systems and hiring halls established in the Local Unions' area collective bargaining agreements. 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 is unable to 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.

B. A Contractor may request by name, and the Local will honor, referral of persons who have applied to the Local for Program Work 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 pursuant to New York City Administrative Code §6-129, that are not signatory to any Schedule A CBAs, with contracts valued at or under five hundred thousand (\$500,000), may request by name, and the Local will honor, referral of the second (2nd), fourth (4th), sixth (6th), and eighth (8th) employee, who have applied to the Local for Program Work 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 work days prior to the contract award.

For such contracts valued at above \$500,000 but less than \$1 million, the Local will honor referrals by name of the second (2nd), fifth (5th), and eighth (8th) employee subject to the foregoing requirements. In both cases, name referrals will thereafter be in accordance with Section 2(B), above.

D. Where a certified MWBE Contractor voluntarily enters into a Collective Bargaining Agreement ("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

NYC AGENCY RENOVATION & REHAB CITY OWNED BUILDINGS/STRUCTURES

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 AND FEMALE REFERRALS

In the event a Local Union either fails, or is unable to refer qualified 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 minority or female applicants from any other available source.

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. UNION DUES

All employees covered by this Agreement shall be subject to the union security provisions contained in the applicable Schedule A local agreements, as amended from time to time, but only for the period of time during which they are performing on-site Program Work and only to the extent of tendering payment of the applicable union dues and assessments uniformly required for union membership in the Local Unions which represent the craft in which the employee is performing Program Work. No employee shall be discriminated against at any Program Work site because of the employee's union membership or lack thereof. In the case of

unaffiliated employees, the dues payment will be received by the Local Unions as an agency shop fee.

SECTION 7. 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, 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 Collective Bargaining Agreement prohibits a foreperson from working when the craft persons he is leading exceed a specified number.

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.

SECTION 2. STEWARDS

A. Each Local Union shall have the right to designate a working journey person as a Steward and an alternate, and shall notify the Contractor and Construction Manager 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

NYC AGENCY RENOVATION & REHAB CITY OWNED BUILDINGS/STRUCTURES

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 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 provision, such provision shall be recognized to the extent the Steward possesses the necessary qualifications to perform the work required. 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 work force, 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 Contractors' 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" that includes a lawful union standards and practices clauses, then such clause as set forth in Schedule A Agreements 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 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 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 or Richard Adelman; 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 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,

NYC AGENCY RENOVATION & REHAB CITY OWNED BUILDINGS/STRUCTURES

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 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 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 and workforce participation goals for minority and female employees.

SECTION 2. COMPOSITION

The Committee 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 may mutually designate an MWBE representative to participate in appropriate Committee discussions. The Committee 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.

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 Construction Manager (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:

The Business Manager or designee of the involved Local Union, together with representatives of the involved Contractor, Council and the Construction Manager (or designee), shall meet in Step 2 within 7 calendar days of service of the written grievance to arrive at a satisfactory settlement.

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) to J.J. Pierson or Richard Adelman, who shall act, alternately (beginning with Arbitrator J.J. Pierson), as the Arbitrator under this procedure. 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 Construction Manager (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 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 trustee employee benefit funds designated in Schedule A (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 trustee 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 Contractors signatory to local collective bargaining agreement with any affiliated union from complying with the fringe benefit requirements for all funds contained in the CBA.

B. The Contractors agree to be bound by the written terms of the legally established jointly trustee 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.

C. 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.

NYC AGENCY RENOVATION & REHAB CITY OWNED BUILDINGS/STRUCTURES

D. 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 which the union and/or fringe benefit fund claims to be due it, and deposit such amount when and so withheld in a separate interest-bearing account pending resolution of the dispute pursuant to the union's Schedule A agreement, and the amount so deposited together with the interest thereon shall be paid to the party or parties ultimately determined to be entitled thereto, or held until the Delinquent Contractor and union or fringe 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.

E. 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

NYC AGENCY RENOVATION & REHAB CITY OWNED BUILDINGS/STRUCTURES

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 WORK DAY

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.

B. In accordance with Program 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 - 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 schedule a four day work week, 10 hours per day 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 over eight (8) hours in a day where 5/8s is scheduled or for work over ten (10) hours in a day where 4/10s is scheduled and over forty (40) hours in a week, 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. 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 work days notice to the Local Union or such lesser notice as may be mutually agreed upon.

B. Second and/or Third Shifts/Saturday and/or Sunday Work - - 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 there

NYC AGENCY RENOVATION & REHAB CITY OWNED BUILDINGS/STRUCTURES

shall be a 5% shift premium. No other premium or other payments for such work shall be required unless such work is in excess of 40 hours in the week. All employees within a classification performing Program Work will be paid at the same wage rate regardless of the shift or work scheduled 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 8 recognized holidays on the Project:

New Years Day	Labor Day
Martin Luther King Day	President's Day
Memorial 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 recognized holiday shall be in accordance with the applicable Schedule A.

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

SECTION 5. SATURDAY 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 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 or 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 his full shift.

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 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 lay off 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 8 hours wages for that day. 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 brassing or other systems to check employees in and out. Each employee must check in and out. 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.

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

SECTION 1. RATIOS

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 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. 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 and Helmets to Hardhats.

ARTICLE 14-SAFETY PROTECTION OF PERSON AND PROPERTY

SECTION 1. SAFETY REQUIREMENTS

NYC AGENCY RENOVATION & REHAB CITY OWNED BUILDINGS/STRUCTURES

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.

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 this 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

Temporary services, i.e. all temporary heat, water, power and light, shall only be required upon the specific request of the Agency or Construction Manager, and when so requested shall be assigned to the appropriate trade claiming jurisdiction. Temporary system coverage shall be provided by the appropriate Contractors' existing employees during working hours in which a

NYC AGENCY RENOVATION & REHAB CITY OWNED BUILDINGS/STRUCTURES

shift is scheduled for employees of this Contractor. The Agency or Construction Manager may determine the need for temporary system coverage requirements during non-working hours. There shall be no stacking of trades on temporary services. In the event a temporary system 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, age or any other status provided by law, in any manner prohibited by law or regulation.

SECTION 2. LANGUAGE OF AGREEMENT

The use of the masculine or feminine gender in this Agreement shall be construed as including both genders.

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 WORK DAY

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 NYS Department of Labor, 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 Program 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 Program 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 Collective Bargaining Agreements which are the basis for Schedule A notify the Agency and Construction Manager in writing of the hourly rate changes agreed to in that Area Collective Bargaining which are applicable to work covered by this Agreement and their effective dates.

B. It is agreed that any provisions negotiated into Schedule A collective bargaining agreements 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 Collective Bargaining Agreements 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 Collective Bargaining Agreements 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.

NYC AGENCY RENOVATION & REHAB CITY OWNED BUILDINGS/STRUCTURES

An ADR program may be negotiated and participation in the ADR Program will be optional by trade.

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 Center for Military Recruitment, Assessment and Veterans Employment (hereinafter "Center") and the Center's "Helmets to Hardhats" program 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.

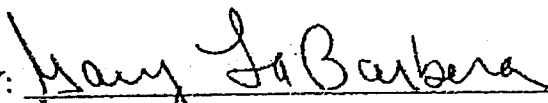
The Unions and Contractors agree to coordinate with the Center to create and maintain an integrated database of veterans interested in working on this Project and of apprenticeship and employment opportunities for this Project. To the extent permitted by law, the Unions will give credit to such veterans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

NYC AGENCY RENOVATION & REHAB CITY OWNED BUILDINGS/STRUCTURES

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: _____
Michael R. Bloomberg
Mayor

APPROVED AS TO FORM:

ACTING CORPORATION COUNSEL
NEW YORK CITY

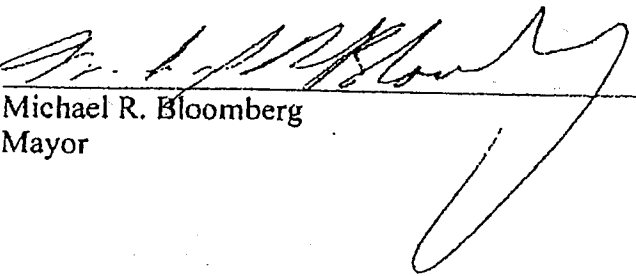
NYC AGENCY RENOVATION & REHAB CITY OWNED BUILDINGS/STRUCTURES

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: 
Michael R. Bloomberg
Mayor

APPROVED AS TO FORM:



ACTING CORPORATION COUNSEL
NEW YORK CITY

DEC 18 2009

THIS PAGE INTENTIONALLY LEFT BLANK

List of Signatory Unions

Blasterers and Drillers Local #29

Bricklayers Local No. 1

Boiler Makers Local No. 5

Carpenters District Council

Cement Masons No. 780

Derrickmen and Riggers Union No. 197

Concrete Workers District Council No. 16, including Cement and Concrete Workers Nos. 6-A, 18-A, and 20

Electrical Local No. 3

Drywall Tapers 1974

Elevator Constructors No. 1

Heat & Frost Insulators Local Union No. 12A

Heat & Frost Insulators Local Union No. 12

Iron Workers No. 40

Iron Workers District Council

Laborers Local No. 78 Asbestos & Lead Abatement

Iron Workers No. 361

Laborers Construction and General Building No. 79

Laborers Local 731

Lathers Metallic Local No. 46

Local Union 8A Glaziers No. 1281

Mason Tenders District Council

Metal Polishers DC 9

Painters District Council No. 9

Painters Structural Steel No. 806

Ornamental Iron Workers No. 580

Plasters Local Union No. 262

Pavers & Road Builders District Council No. 1

Plumbers No. 1

Sheet Metal Workers Local No. 28

Roofers & Waterproofers No. 8

Sheet Metal Workers Local No. 137

Steamfitters Local Union No. 638, including Metal Trades Division

Teamsters Local Union 813

Teamsters Local Union 814

Tile, Marble & Terrazzo B.A.C. Local Union No. 7

PLA Schedule A

The following Collective Bargaining Agreements, as this Schedule may be amended from time to time in accordance with the Agreement, constitute Schedule A:

- (1) Agreement between the Boilermakers Association of Greater New York, Inc. and the International Brotherhood of Boilermakers, Iron Ship Builders, Blacksmiths, Forgers and Helpers AFL-CIO, Lodge No. 5, September 1, 2006 - December 31, 2009.
- (2) Agreement between Association of Cement and Concrete Contractors of New York, Inc. and Cement and Concrete Workers comprised of Local No. 6A, Local No. 18A, Local No. 20 and the Employer, July 1, 2008 - June 30, 2011.
- (3) Agreement between the Cement League and the District Council of Cement and Concrete Workers; Comprised of Local No. 6A, Local No. 18A, Local No. 20; July 1, 2008 - June 30, 2011.
- (4) Agreement between the Cement League and the United Cement Masons' Union Local No. 780, Clarified & Extended from October 23, 1940 to June 30, 2011.
- (5) Building Construction agreement between the Building Contractors Association, Inc. and the District Council of New York City and Vicinity of the United Brotherhood of Carpenters and Joiners of America, AFL-CIO, July 1, 2006 - June 30, 2011.
- (6) General Contractors Association - Carpenters 2006; Agreement Between Members of the General Contractors Association of New York, Inc. and the District Council of Carpenters of New York City and Vicinity, July 1, 2006 - June 30, 2011.
- (7) Trade Agreement between Drywall Tapers and Pointers of Greater New York Local Union 1974, affiliated with International Union of Painters and Allied Trades, AFL-CIO and Drywall Taping Contractors' Association of Greater New York and the Association of Wall-Ceiling & Carpentry Industry of New York, Inc., September 6, 2006 - June 28, 2011; Independent Agreement between Local Union 1974 and Employer.
- (8) Agreement between Allied Building Metal Industries, Inc. and Local Union Nos. 40 and 361 of the International Association of Bridge, Structural and Ornamental and Reinforcing Iron Workers AFL-CIO, July 1, 2008 - June 30, 2014.
- (9) Agreement between Independent Contractors and Local #46 Metallic Lathers Union and Reinforcing Ironworkers of New York and Vicinity of the International Association of Bridge, Structural, Ornamental and Reinforcing Iron Workers, July 1, 2008 - June 30, 2014.
- (10) Agreement of Working Conditions between the Independent Insulation Contractors Association of New York City Inc. and the International Association of Heat and Frost Insulators and Asbestos Workers Local No. 12 of New York City, 2008-2014.

(11) Mason Tenders District Council of Greater New York Master Independent Collective Bargaining Agreement, 2008-2011.

(12) Trade Agreement between District Council No. 9, International Union of Painters and Allied Trades, AFL-CIO and the Association of Master Painters and Decorators of New York, Inc. and the Association of Wall, Ceiling & Carpentry Industries of New York, Inc. and the Window and Plate Glass Dealers Association, May 1, 2005 - April 30, 2011.

(13) Trade Agreement between Enterprise Association Local Union 638 and Mechanical Contractors Association of New York, Inc., July 1, 2008 - June 30, 2011.

(14) Agreement between Allied Building Metal Industries Inc. and Architectural and Ornamental Iron Workers Local Union No. 580 AFL-CIO; July 1, 2008 - June 30, 2011.

(15) Official Working Agreement between Service Contractors Division of the Mechanical Contractors Association of New York and Enterprise Association Metal Trades Branch Local Union 638, July 1, 2007 - June 30, 2010.

(16) Agreement between Association of Contracting Plumbers of the City of New York, Inc. and Local Union No 1 of the United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry of the United States and Canada, July 1, 2007 - June 30, 2010.

(17) Agreement and Working Rules between New York Electrical Contractors Association, Inc. and the Association of Electrical Contractors, Inc. and Local Union No. 3 International Brotherhood of Electrical Workers, AFL-CIO, May 10, 2007 - May 13, 2010.

(18) Official Working Agreement between Service Contractors Division of the Mechanical Contractors Association of New York, Inc. and Enterprise Association Metal Trades Branch Local Union 638, Refrigeration, Air Conditioning, Air Cooling, Oil Burner and Stoker Service and Maintenance Technicians, July 1, 2007 - June 30, 2010.

(19) Structural Steel and Bridge Painters of Greater New York, Local Union No. 806, District Council No. 9, International Union of Painters and Allied Trades, AFL-CIO, CLC and New York Structural Steel Painting Contractors Association, Inc.; Collective Bargaining Agreement, October 1, 2005 - September 30, 2011.

(20) Trade Agreement between United Derrickmen & Riggers Association, Local No. 197 of New York, All long Island, Westchester and Vicinity and Building Stone and Pre-Case Contractors Association, 2008.

(21) Agreement between the Greater New York and New Jersey Tile Contractors Association, Inc., and the Tile Setters and Tile Finishers Union of New York and New Jersey, Local Union No. 7 of the International Union of Bricklayers and Allied Craftworkers, June 8, 2009 - June 2, 2013.

- (22) Agreement between The Building Contractors Association, Inc. and International Union of Operating Engineers Local 15 and 15 A, July 1, 2006-June 30, 2011.
- (23) Agreement dated as of July 1, 2006 between Building Contractors Association and International Union of Operating Engineers Local 14-14B, July 1, 2006-June 30, 2011.
- (24) Agreement Between The Building Contractors Association, Inc. and International Union of Operating Engineers Local 15D affiliated with the AFL-CIO, July 1, 2006-June 30, 2011.
- (25) Local 282 International Brotherhood of Teamsters High Rise Contract, Building Contractors Association and Independents, 2008-2013.
- (26) Building, Concrete, Excavation & Common Laborers Union Local No. 731 Independent Agreement, July 1, 2006-June 30, 2012.
- (27) March 17, 2009 Agreement between ThyssenKrupp Elevator Corp. and International Union of Elevator Constructors, Local 1 of NY and NJ, 2009-2014.
- (28) Working Agreement Local Union No. 8 United Union of Roofers, Waterproofers and Allied Workers and Roofing and Waterproofing Contractor's Association of New York and Vicinity, July 1, 2009-June 30, 2011.
- (29) Standard Form Collective Bargaining Agreement between Sheet Metal Workers' International Association Local Union #137 and the Greater New York Sign Association, July 16, 2007 – July 15, 2010.
- (30) Trade Agreement between _____ and Local No. 1 New York of the International Union of Bricklayers and Allied Craftworkers, July 1, 2008 – July 30, 2011.

THIS PAGE INTENTIONALLY LEFT BLANK

NYC AGENCY RENOVATION & REHAB CITY OWNED BUILDINGS/STRUCTURES

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 _____ 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 and local trust agreements as set forth in the Project Labor Agreement and this Agreement 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.

Dated: _____

(Name of Contractor or subcontractor)

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

(Authorized Officer & Title)

(Address)

(Phone) (Fax)

Contractor's State License

Sworn to before me this
____ day of _____, 2009

Notary Public

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 days 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.

NOTICE TO BIDDERS

DAMAGES FOR DELAY PILOT PROGRAM

Please be advised that this contract is part of a pilot program in which the Standard Construction Contract provisions concerning delay damages have been revised to allow contractors to be reimbursed for specified additional costs that are attributable to a delay in the performance of the work resulting from certain acts or omissions of the City agency or its representatives. Certain changes are highlighted here to alert bidders to the pilot program. Please see Articles 11, 12.3, and 13.10 of the Standard Construction Contract for a full understanding and the actual text of the pilot program. The text of the revised Standard Construction Contract is the controlling document should there be any discrepancies between this notice and the Standard Construction Contract.

Changes to Articles 11, 12.3, and 13.10 of the Standard Construction Contract permit contractors to make claims for delay damages relating to the following circumstances:

The failure of the City to take reasonable measures to coordinate and progress the Work;

Extended delays attributable to the City in the review or issuance of change orders, in shop drawing reviews and approvals or as a result of the cumulative impact of multiple change orders, which constitute a material change to the Work and which have a verifiable impact on project costs.

The unavailability of the site for an extended period of time that significantly affects the scheduled completion of the contract.

The issuance by the City of a stop work order relative to a substantial portion of work for a period exceeding thirty days, that was not brought about through any action or omission of the Contractor.

Differing site conditions that were not known or 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.

Delays caused by the City's bad faith or its willful, malicious, or grossly negligent conduct;

Delays not contemplated by the parties;

Delays so unreasonable that they constitute an intentional abandonment of the Contract by the City; and

Delays resulting from the City's breach of a fundamental obligation of the Contract.

Please see Article 11.4 for provisions regarding compensable delays.

Specific exclusions to claims for damages also apply, such as for third party (non-City) acts and omissions, court orders, strikes or *force majeure* events. For provisions related to non-compensable delays, please see Article 11.5.

For those delays where damages are available, Article 11 also sets forth what costs are recoverable. Please see Article 11.7 for which costs are recoverable and which costs are non-recoverable.

Article 11 also contains provisions concerning notice and documentation of claims. Please see Articles 11.1, 11.2, and 11.6. Contractors must comply with the notice requirements in order to preserve their claims. Consequently, please read these sections carefully. Delay damages are compensable only if they were actually, reasonably and necessarily incurred and are verified by appropriate documentation submitted at the appropriate times.

Claims for delay damages are not covered by the dispute resolution process in Article 27 of the Standard Construction Contract. See Article 11.8. When the amount of delay damages are agreed upon, such damages may be paid through a change order.

NOTICE TO BIDDERS, PROPOSERS, CONTRACTORS, AND RENEWAL CONTRACTORS

This contract includes a provision concerning the protection of employees for whistleblowing activity, pursuant to New York City Local Law Nos. 30-2012 and 33-2012, effective October 18, 2012 and September 18, 2012, respectively. The provisions apply to contracts with a value in excess of \$100,000.

Local Law No. 33-2012, the Whistleblower Protection Expansion Act ("WPEA"), prohibits a contractor or its subcontractor from taking an adverse personnel action against an employee or officer for whistleblower activity in connection with a City contract; requires that certain City contracts include a provision to that effect; and provides that a contractor or subcontractor may be subject to penalties and injunctive relief if a court finds that it retaliated in violation of the WPEA. The WPEA is codified at Section 12-113 of the New York City Administrative Code.

Local Law No. 30-2012 requires a contractor to prominently post information explaining how its employees can report allegations of fraud, false claims, criminality, or corruption in connection with a City contract to City officials and the rights and remedies afforded to employees for whistleblowing activity. Local Law No. 30-2012 is codified at Section 6-132 of the New York City Administrative Code.

WHISTLEBLOWER PROTECTION EXPANSION ACT RIDER

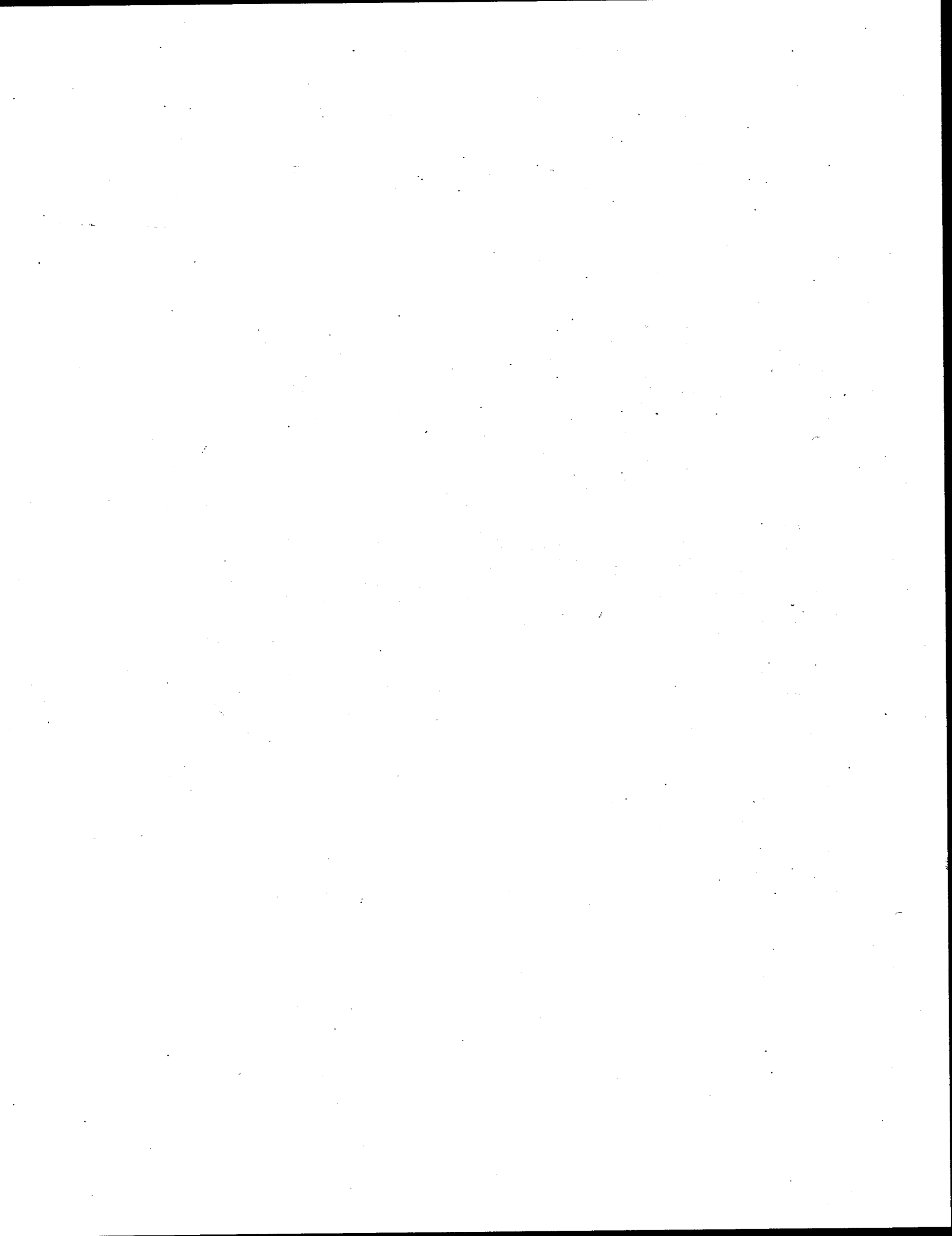
1. In accordance with Local Law Nos. 30-2012 and 33-2012, codified at sections 6-132 and 12-113 of the New York City Administrative Code, respectively,
 - (a) Contractor shall not take an adverse personnel action with respect to an officer or employee in retaliation for such officer or employee making 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 (i) the Commissioner of the Department of Investigation, (ii) a member of the New York City Council, the Public Advocate, or the Comptroller, or (iii) the City Chief Procurement Officer, ACCO, Agency head, or Commissioner.
 - (b) If any of Contractor's officers or employees believes that he or she has been the subject of an adverse personnel action in violation of subparagraph (a) of paragraph 1 of this rider, he or she shall be entitled to bring a cause of action against Contractor to recover all relief necessary to make him or her whole. Such relief may include but is not limited to: (i) an injunction to restrain continued retaliation, (ii) reinstatement to the position such employee would have had but for the retaliation or to an equivalent position, (iii) reinstatement of full fringe benefits and seniority rights, (iv) payment of two times back pay, plus interest, and (v) compensation for any special damages sustained as a result of the retaliation, including litigation costs and reasonable attorney's fees.
 - (c) 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:
 - (i) how its employees can report to the New York City Department of Investigation allegations of fraud, false claims, criminality or corruption arising out of or in connection with the Contract; and
 - (ii) the rights and remedies afforded to its employees under New York City 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 with the reporting of allegations of fraud, false claims, criminality or corruption in connection with the Contract.
 - (d) For the purposes of this rider, "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.
 - (e) This rider is applicable to all of Contractor's subcontractors having subcontracts with a value in excess of \$100,000; accordingly, Contractor shall include this rider in all subcontracts with a value a value in excess of \$100,000.
2. Paragraph 1 is not applicable to this Contract if it is valued at \$100,000 or less. Subparagraphs (a), (b), (d), and (e) of paragraph 1 are not applicable to this Contract if it was solicited pursuant to a finding of an emergency. Subparagraph (c) of paragraph 1 is neither applicable to this Contract if it was solicited prior to October 18, 2012 nor if it is a renewal of a contract executed prior to October 18, 2012.

NOTICE TO BIDDERS

Please be advised that the City of New York has revised the form of the performance bond that is required for City construction contracts that do not exceed \$5 million. The form of bond required for contracts that are greater than \$5 million has not changed. The City now has two approved forms. One form is to be used for contracts that do not exceed \$5 million and one form is to be used for contracts above \$5 million. The City's payment bond remains unchanged.

The new bond form for contracts that do not exceed \$5 million has been approved by the U.S. Small Business Administration ("SBA") for participation in their Bond Guarantee Program. The SBA's Bond Guarantee Program enables eligible small businesses to obtain or increase bonding by having the SBA act as a partial guarantor of the contractor to the surety. If you are interested in participating in this program, we suggest that you contact your broker or the SBA.

In order to maximize participation by small businesses in the SBA Guarantee Program, the City also encourages prime contractors who are awarded contracts greater than \$5 million to allow their subcontractors to use the SBA-approved form, particularly on contracts that are subject to Local Law 129 (the M/WBE program), if the prime contractor requires subcontractors to obtain performance bonds.



Notice to Bidders:

In 2013 the City will be implementing a new web based subcontractor reporting system. Once this subcontractor reporting system is implemented, and Contractor receives notice of its implementation, Contractor will be required to list in the system all of the subcontractors that it knows it will use or is already using in the performance of this contract. For each subcontractor listed, Contractor will be required to provide the following information: maximum contract value, description of subcontractor work, start and end date of the subcontract and identification of the subcontractor's industry. Identification of subcontractors in the system along with the required information will be required in order to obtain subcontractor approval under [section 3.02 of Appendix A][Article 17 of the Standard Construction Contract] and PPB Rule § 4-13 for all subcontractors that have not been approved as of the implementation date. Thereafter, Contractor will be required to report in the system the payments made to each subcontractor within 30 days of making the 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...

When the subcontractor reporting system is implemented, Contractor will receive a written notice from the City which will contain the information the Contractor will need to list its subcontractors and report payments. Contractor will not be required to comply with the requirements set forth herein until such notice is issued. Contractor will have 30 days from the date of the notice to list its current subcontractors for which it has already received Agency approval, if any. Thereafter, for those subcontractors that have not yet been approved by the Agency, subcontractors will have to be listed in the system in order to obtain the required Agency approval.

Failure of the Contractor to list a subcontractor and/or to report subcontractor payments in a timely fashion may result in the Agency declaring the Contractor in default of the Contract and may 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. For construction contracts, the provisions of Article 15 of the Standard Construction Contract shall govern the issue of liquidated damages.

Contractor hereby agrees to these provisions and acknowledges that they will become effective on the date set forth in the notice.

THIS PAGE INTENTIONALLY LEFT BLANK

CITY OF NEW YORK
DEPARTMENT OF
DESIGN AND CONSTRUCTION
DIVISION OF STRUCTURES

INFORMATION FOR BIDDERS

DELAY DAMAGES PILOT

September 2008

THIS PAGE INTENTIONALLY LEFT BLANK

INFORMATION FOR BIDDERS

1. Description and Location of Work

The description and location of the work for which bids are requested are specified in Attachment 1, "Bid Information". Attachment 1 is included in the Bid Booklet.

2. Time and Place for Receipt of Bids

Sealed bids shall be received on or before the date and hour specified in Attachment 1, at which time they will be publicly opened and read aloud in the presence of the Commissioner or his 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, if used, 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 at the location set forth in Attachment 1.

(C) Deposit for Copy of Invitation For Bids Documents: Prospective bidders may obtain a copy of the Invitation For Bids Documents by complying with the conditions set forth in the Notice of Solicitation. The deposit must be in the form of a check or money order made payable to the City of New York, and drawn upon a state or national bank or trust company, or a check of such bank or trust company signed by a duly authorized officer thereof.

(D) Return of Invitation For Bids Documents: All Invitation For Bids Documents must be returned to the Department upon request. If the bidder elects not to submit a bid thereunder, the Invitation For Bids Documents shall be returned to the Department, along with a statement that no bid will be submitted.

(E) Return of Deposit: Such deposit will be returned within 30 days after the award of the contract or the rejection of all bids as set forth in the advertisement, provided the Invitation For Bids Documents are returned to the location specified in Attachment 1, in physical condition satisfactory to the Commissioner.

(F) Additional Copies: Additional copies of the Invitation For Bids Documents may be obtained, subject to the conditions set forth in the advertisement for bids.

5. Pre-Bid Conference

A pre-bid conference shall be held as set forth in Attachment 1. 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 Attachment 1.

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 Attachment 1.

(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 he 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 his 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.

THE BID SHALL BE TYPEWRITTEN OR WRITTEN LEGIBLY IN INK. THE BID SHALL BE SIGNED IN INK. ERASURES OR ALTERATIONS SHALL BE INITIALED BY THE SIGNER IN INK. FAILURE TO CONFORM TO THE REQUIREMENTS OF THIS SECTION 10 SHALL RESULT IN THE REJECTION OF 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 Attachment 1, 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 his option, may ask to be relieved of his 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.

(D) 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. VENDEX Questionnaires

(A) Requirement: Pursuant to Administrative Code Section 6-116.2 and the PPB Rules, bidders may be obligated to complete and submit VENDEX Questionnaires. Generally, if this bid is \$100,000 or more, or if this bid when added to the sum total of all contracts, concessions and franchises the bidder has received from the City and any subcontracts received from City contractors over the past twelve months, equals or exceeds \$100,000, Vendex Questionnaires must be completed. If required, Vendex Questionnaires must be completed and submitted before any award of contract may be made or before approval is given for a proposed subcontractor. Non-compliance with these submission requirements may result in the disqualification of the bid, disapproval of a subcontractor, subsequent withdrawal of approval for the use of an approved subcontractor, or the cancellation of the contract after its award.

(B) Submission: Vendex Questionnaires must be submitted directly to the Mayor's Office of Contract Services, ATTN: Vendex, 253 Broadway, 9th Floor, New York, New York 10007. In addition, the bidder must submit a Confirmation of Vendex Compliance to the agency. A form for this confirmation is set forth in the Bid Booklet.

(C) Obtaining Forms: Vendex Questionnaires, as well as detailed instructions, may be obtained at www.nyc.gov/vendex. The bidder may also obtain Vendex forms and instructions by contacting the Agency Chief Contracting Officer or the contact person for this contract.

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)669-2797.

26. Bid, Performance and Payment Security

(A) Bid Security: Each bid must be accompanied by bid security in an amount and type specified in Attachment 1. 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 Attachment 1. 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 Attachment 1. 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 202-512-1800; (2) through the Internet at <http://www.fms.treas.gov/c570/index.html>, and (3) through a computerized public bulletin board, which can be accessed by using your computer modem and dialing 202-874-6887.

(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 his 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 his 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 Bid Booklet.

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 Form, 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 it 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 on page 2 of the Bid Booklet.

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.

CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
SAFETY REQUIREMENTS

THE DDC SAFETY REQUIREMENTS INCLUDE THE FOLLOWING SECTIONS:

- I. POLICY ON SITE SAFETY
- II. PURPOSE
- III. DEFINITIONS
- IV. RESPONSIBILITIES
- V. SAFETY QUESTIONNAIRE
- VI. SAFETY PROGRAM AND SITE SAFETY PLAN
- VII. KICK-OFF/PRE-CONSTRUCTION MEETINGS AND SAFETY REVIEW
- VIII. EVALUATION DURING WORK IN PROGRESS
- IX. SAFETY PERFORMANCE EVALUATION

THIS PAGE INTENTIONALLY LEFT BLANK

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 jobsites must, at a minimum, comply with applicable federal, state and city laws, rules and regulations, including without limitation:

- ☐ U. S. Department of Labor 29 Code of Federal Regulations (CFR) Part 1926 and applicable Sub-parts of Part 1910 – U.S. Occupational Safety and Health Administration (OSHA) including, but not limited to "Respiratory Protection" (29 CFR 1910.134), "Permit-Required Confined Spaces" (29 CFR 1910.146), and "Hazard Communication" (29 CFR 1910.1200);
- ☐ New York State Department of Labor Industrial Code Rule 23 – Protection in Construction, Demolition and Excavation;
- ☐ New York City Construction Codes, Title 28
- ☐ NYC Department of Transportation Title 34 Chapter 2 – Highway Rules
- ☐ New York State Department of Labor Industrial Code Rule 753
- ☐ NYC Local Law No. 113 (2005) Noise Control Code

In addition, all regulations promulgated by the NYC Department of Transportation, including requirements for Maintenance and Protection of Traffic (MPT), are applicable when contained in contract specifications. While MPT is a significant component of work in our Infrastructure Division, it does not supersede or exempt Contractors from complying with other applicable health and safety standards (for example, excavating and trenching standards, operation of heavy equipment and compliance with City environmental and noise regulations).

I. 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 hazard, 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 shall mean the person delegated authority by the Commissioner to organize and supervise the procurement activity of subordinate Agency staff in conjunction with the 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.

Construction Safety Auditor: A representative of the QACS Construction Safety Unit 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 surveys, reviewing health and safety plans, reviewing construction permits, and rendering technical advice and assistance to DDC Resident Engineers and Project Managers.

Construction Safety Unit: A part of QACS within the Division of Technical Support that assesses contractor safety on DDC jobsites and advises responsible parties of needed corrective actions.

Construction Superintendent: A representative of the contractor responsible for overseeing performance of the required construction work. This individual must engage in sound construction practices, and is responsible to maintain a safe work site. In the case of a project involving the demolition, alteration or new construction of buildings, the Construction Superintendent must be licensed by the NYC Department of Buildings.

Contractor: For purposes of these Safety Requirements, the term "Contractor" shall mean any person or entity that enters into a contract for the performance of construction work on a DDC project. The term "Contractor" shall 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").

Director - Quality Assurance and Construction Safety (QACS): Responsible for the operations of the QACS Construction Safety Unit and the DDC Site Safety management programs.

Job Hazard Assessment (JHA): A process of identifying site-specific hazards that may be present during construction and establishing the means and methods to reduce or eliminate those hazards.

Jobsite Safety Coordinator: A person designated by the Contractor to be onsite during all activities. This individual shall have received, at a minimum, the OSHA 10-hour construction safety program. Other examples of acceptable training are the 30-hour OSHA Safety and Health Standards for the Construction Industry training program (OSHA 510) or a degree/certificate in a safety and health from a college-level curriculum. This person does not necessarily have to be dedicated full-time to site safety, but must have sufficient experience and authority to undertake corrective action and must qualify to be a competent person. For certain projects, as defined in NYC Construction Codes – Title 28, this person may be required to have a Site Safety Manager's License issued by the NYC DOB.

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 and trenching and shoring, among others.

Resident Engineer (RE) / Construction Project Manager (CPM): Representative of the Commissioner duly designated by the Commissioner to be his/her representative at the site of the work. (The RE/CPM may be a third-party consultant, including a CM, retained by DDC.)

Safety Program: Established by the Contractor that covers all operations of that Contractor and establishes the Contractor's overall safety policy, regulatory compliance plan and minimum safety standards. The Safety Program must be submitted prior to the commencement of work at the site and is subject to review and acceptance by the Construction Safety Unit.

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 Plan: A site-specific safety plan developed by the Contractor for a specific project. The Site Safety Plan must identify hazards associated with the project, and include specific safety precautions and training appropriate and necessary to complete the work. The Site Safety Plan must be submitted prior to the commencement of work at the site and is subject to review and acceptance by the Construction Safety Unit.

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 documented 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.

IV. RESPONSIBILITIES

All persons who manage, perform, and provide support for construction projects shall 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 / Construction Project Manager / Construction Manager

- Monitors the issuance of safety-related permits, approvals and drawings and maintains copies on site.
- Monitors construction-related work activities to confirm that they are conducted in accordance with DDC policies and all applicable regulations that pertain to construction safety.
- Maintains documentation and periodically attends weekly safety meeting.
- Notifies the Construction Safety Unit and the ACCO's Insurance and Risk Management Unit of project-related accidents and emergencies, as per DDC's Construction Safety Emergency Protocol.
- Gathers facts related to all accidents and prepares DDC Accident Reports.
- Notifies the Construction Safety Unit of outside regulatory agency inspections and forwards a copy of the inspection report within three days of its receipt.
- Monitors the conditions at the site for conformance with the Site Safety Plan and DDC construction documents.
- Notifies the contractor and DDC in the event that any condition or activity exists that is not in compliance with the 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.
- Notifies DDC of any emergency condition and directs the contractor to provide such labor, materials, equipment and supervision to abate such conditions.
- Reports gross safety violations to the Construction Safety Unit immediately.

A. Contractors

- Complete a Safety Questionnaire and submit with its bid or as part of a pre-qualification package.
- Provide a Written Job Hazard Assessment (JHA) that identifies expected safety issues of the work to be performed. JHA shall be included with the Site Safety Plan submitted by the contractor.
- Submit a Site Safety Plan and Safety Program within 15 days of issuance of the Notice to Proceed, or as otherwise directed. The Site Safety Plan and Safety Program are subject to review and acceptance by the Construction Safety Unit prior to the commencement of work at the site. The Site Safety Plan shall be revised and updated as necessary.
- Ensure that all employees are aware of the hazards associated with the project through formal and informal training and/or other communications. Conduct and document weekly safety meetings for the duration of the project. Documentation to be provided to the RE/CPM/CM on a monthly basis.
- Name a Construction Superintendent, if required.
- Name a Job Site Safety Coordinator. The Contractor will be required to identify the Job Site Safety Coordinator in the Site Safety Plan.
- Comply with all mandated federal, state and local safety and health rules and regulations.
- Comply with all provisions of the Site Safety Plan.
- As part of the Site Safety Plan, prepare a site specific MPT (if not otherwise provided in the contract documents) and comply with all of its provisions.
- Conduct and document site-specific safety orientation for Contractor 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 Job Site Safety Coordinator will conduct this training prior to mobilization and provide documentation to the RE/CPM/CM.
- 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.).
- Report unsafe conditions or hazards to the DDC RE/CPM/CM as soon as practical, but no more than 24 hours after discovery, and take action to remove or abate such conditions.

- Report any accident involving injuries to workers or the general public, as well as property damage, to the DDC RE/CPM/CM within two (2) hours.
- Notify the DDC RE/CPM/CM within two (2) hours of the start of an inspection by any regulatory agency personnel, including OSHA.
- Maintain all records pertaining to all required compliance documents and accident and injury reports.
- Respond to DDC recommendations on safety, which shall 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 and environmental 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 must submit a completed DDC Safety Questionnaire listing their workers' compensation experience modification rating and OSHA Incidence 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 must provide the requested update within 30 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 years; and
- Criteria 4: A fatality (worker or member of public) experienced on or near Contractor's worksite within the last three (3) years; and
- Criteria 5: ~~An unacceptable rating by QACS based on past performance on DDC projects; and~~
- Criteria 6: Contractor has in place an acceptable corporate safety program and its employees shall have completed all documented relative safety training; and
- Criteria 7: Contractor shall provide OSHA Injury Records (currently OSHA 300 Log) for the last three (3) years.

If the Contractor fails to meet the basic criteria listed above, the Construction Safety Unit may request, through the ACCO, more detail concerning the Contractor's safety experience. DDC may request the Contractor to provide copies of, among other things, OSHA records, OSHA and DOB citations, EPA citations and written Safety Programs.

VI. SAFETY PROGRAM AND SITE SAFETY PLAN

Within fifteen (15) days of issuance of the Notice to Proceed, or as otherwise directed, the Contractor shall submit the following: (1) Safety Program, and (2) Site Safety Plan. The Safety Program shall set forth the Contractor's overall safety policy, regulatory compliance plan and minimum safety standard, and the Site Safety Plan shall identify hazards associated with the project, and include specific safety precautions and training appropriate and necessary to complete the work. The Safety Program and the Site Safety Plan are subject to review and acceptance by the Construction Safety Unit prior to the commencement of work at the site. Failure by the contractor to submit an acceptable Site Safety Plan and Safety Program shall be grounds for default.

The Site Safety Plan shall apply to all Contractor and subcontractor operations, and shall have at a minimum, the following elements. Each element shall be described in a separate section in the written document. It may be necessary to modify the basic format for certain unique or high-risk projects (such as tunnels or high-rise construction). The basic elements are as follows:

1. **Responsibility and Organization:** Identify the person or persons with authority and responsibility for implementing the Site Safety Plan. Provide an organization chart and define levels of authority and responsibility. Identify the Competent Person, the Construction Superintendent (if required), the Job Safety Coordinator and the Qualified Person required for this project.
2. **Communication:** Establish a system for communicating with employees and subcontractors on matters relating to worker and public safety and health and environmental protection, including provisions designed to encourage employees to inform the employer of hazards at the worksite without fear of reprisal. An emergency response notification protocol is to be established that also includes after hours contact numbers. The plan must also include provisions for weekly safety meetings held by the Job Site Safety Coordinator.
3. **Job Hazard Assessment:** A written document submitted by the contractor, used to identify expected job hazards and public safety risks and state the specific means and methods to reduce, control or eliminate those hazards. This part of the Site Safety Plan must also include how on-going evaluations of those risks and hazards will be carried out, including plans for periodic inspections to identify unsafe conditions, work practices and public safety hazards.
4. **Accident/Exposure Investigation:** Establish a procedure to investigate and report occupational and public injury or illness, property damage, vehicle accidents or other mishaps.
5. **Hazard Correction:** Establish means, methods and/or procedures for correcting unsafe or unhealthy conditions that might be exposing both the public and workers to hazards. Corrective actions must be taken immediately when observed or discovered. Should an imminent hazard exist which cannot be immediately abated without endangering employees, the public and/or property, remove or restrict all exposed persons from the area except those necessary to correct the existing condition. Employees necessary to correct the hazardous condition shall be provided the necessary safeguards. When corrective actions cannot be taken immediately, temporary measures should be taken until such time permanent measures are taken to eliminate the potential risks or hazards.
6. **Training:** Describe site-specific hazard training programs. In addition to the required safety orientation, additional site specific training, in the form of required weekly safety meetings, will be required. Contractors must also initiate training when: a) new employees are hired; b) employees are given new job assignments for which training has not been previously received; c) new substances, processes, procedures or equipment are introduced that might represent a new public or worker hazard; d) the employee is made aware of a new or previously unrecognized hazard; e) new supervisors are assigned to familiarize themselves with the safety and health hazards to which employees under their immediate direction and control may be exposed; and f) after a jobsite incident or accident has occurred.
7. **Recordkeeping:** Establish procedures to maintain records of scheduled and periodic inspections, weekly safety meetings, and training records. Updated records shall be maintained at the jobsite, accessible to the Construction Safety Auditors and/or Quality Assurance Auditors/RE/CPM, and retained in accordance with DDC policy.

The most critical component of the Site Safety Plan is the Job Hazard Assessment section. This section must address specific hazards that are anticipated throughout the project. Each Site Safety Plan must address, at a minimum:

- Public and pedestrian safety
- Fall protection
- Electrical hazards
- Scaffolding
- Fire protection
- Emergency notification & response
- Housekeeping / debris removal
- Dust control
- Maintenance and protection of traffic
- Trenching and excavating
- Heavy equipment operations
- Material / equipment storage
- Environmental contamination
- Sheeting and shoring
- Alcohol and Drug Abuse Policy

The following additional hazards must be addressed, if applicable, based on the contract safety specifications and/or the results of the JHA (the list is not all-inclusive):

- Basic Personal Protective Equipment
- Compressed Air
- Compressed Gas Cylinders
- Cranes, Derricks and Hoists
- Demolition
- Electrical safety
- Excavations and Trenching
- Fall Protection – Floor openings/Stairways
- Fall Protection – Guardrails Toe boards etc
- Fall Protection – Leading Edge
- Fall Protection – Personal Fall Protection Devices
- Fire Protection and Fire Prevention
- Hazard Communication (RIGHT TO KNOW)
- Hazardous Energy & Lock Out / Tag Out
- Housekeeping/ Sanitation
- Maintenance and Protection of Traffic (MPT)
- Man Lifts /Aerial Lifts
- Marine Operations
- Motor Vehicle Safety
- Overhead Power lines
- Permit Required Confined Space
- Portable Ladders
- Powered Actuated Tools
- Powered Material Handling Equipment
- Scaffolds – Mobile
- Scaffolds – Stationary
- Scaffolds – Suspended
- Slings
- Steel Erection
- Welding and Cutting (Hot Work)
- Airborne Contaminants – Particulates – General
- Asbestos
- Blood borne Pathogens
- Hearing Protection
- Lead in Construction
- Mercury in Construction
- PCB's
- Respiratory Protection
- Silica
- Thermal Stress
- West Nile Virus
- Rodents and Vermin
- Noise Mitigation Plan

Certain DDC programs, such as Job Order Contracting System (JOCS), may not necessarily require Site Safety Plans. The JOCS contractor will be required to submit a Safety Program. In addition, certain DDC Operating Units may establish program or client-specific safety requirements. The contractor's Site Safety Plan must address such program or client specific safety requirements.

VII. KICK-OFF MEETINGS/PRE-CONSTRUCTION AND SAFETY REVIEW

As part of the construction kick-off meeting, a Site Safety Plan review will be part of the agenda. A QACS representative will participate in this meeting with the contractor prior to the start of the project for the purpose of:

- A. Reviewing the safety issues detailed in the contract.
- B. Reviewing the Site Safety Plan.
- C. Reviewing any new issues or information that was not previously addressed.
- D. Discussing planned inspections and audits of the site by DDC 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 Construction Safety Unit or other designated DDC representative or Consultant during regular, unannounced inspections of the job site. Field Exit Conferences will be held with the RE/CPM, Contractor Superintendents or Safety Representatives.
- B. The RE/CPM will continually monitor the safety and environmental performance of the contractor's employees and work methods. Deficiencies shall be brought to the attention of the contractor's representative on site for immediate correction. The DDC representative will maintain a written record of these deficiencies and forward them to the Construction Safety Unit on a weekly basis. Any critical deficiencies shall be immediately reported to QACS phone# (718) 391-1624 or (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- QACS, or designee will meet with the Contractor's safety representative, the DDC project manager, the RE/CPM, or 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 to occur with inadequate attention by the contractor, this shall, among other remedies available, be grounds for default.
- E. The contractor shall inform the Construction Safety Unit and ACCO Insurance and Risk Management Unit of all medical injuries or illnesses that require doctors' treatment resulting from an on-the-job incident within 24 hours of the occurrence. The Construction Safety Unit shall also be immediately informed of all fatalities, catastrophic accidents with more than one employee hospitalized, any injuries to members of the general public and major equipment damage (e.g., property damage, equipment rollovers, loads dropped from crane). QACS shall maintain a record of all contractor injuries and illnesses during the project and provide regular reports to the Agency.
- F. The Construction Safety Unit shall be immediately notified at the start of any NYS-DOL/ NYC-COSH/ OSHA/ EPA inspections. The Director of Quality Assurance & Construction Safety shall maintain a log of all contractor OSHA/EPA inspections and citations during the project.

IX. SAFETY PERFORMANCE EVALUATION

The contractor's safety record, including all DDC 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 shall be a reason to rate a Contractor unsatisfactory which will be reflected in the City's Vendex system and will be considered for future procurement actions as set forth in the City's Procurement Policy Board Rules.

THIS PAGE INTENTIONALLY LEFT BLANK

CITY OF NEW YORK
STANDARD CONSTRUCTION CONTRACT
DELAY DAMAGES PILOT

September 2008

THIS PAGE INTENTIONALLY LEFT BLANK

**CITY OF NEW YORK
STANDARD CONSTRUCTION CONTRACT**

TABLE OF CONTENTS

CHAPTER I

THE CONTRACT AND DEFINITIONS

ARTICLE 1.	THE CONTRACT	1
ARTICLE 2.	DEFINITIONS	1

CHAPTER II

THE WORK AND ITS PERFORMANCE

ARTICLE 3.	CHARACTER OF THE WORK	4
ARTICLE 4.	MEANS AND METHODS OF CONSTRUCTION	4
ARTICLE 5.	COMPLIANCE WITH LAWS	4
ARTICLE 6.	INSPECTION	9
ARTICLE 7.	PROTECTION OF WORK AND OF PERSONS AND PROPERTY; NOTICES AND INDEMNIFICATION	10

CHAPTER III

TIME PROVISIONS

ARTICLE 8.	COMMENCEMENT AND PROSECUTION OF THE WORK	11
ARTICLE 9.	PROGRESS SCHEDULES	11
ARTICLE 10.	REQUESTS FOR INFORMATION OR APPROVAL	12
ARTICLE 11.	NOTICE OF CONDITIONS CAUSING DELAY AND DOCUMENTATION OF DAMAGES CAUSED BY DELAY	12
ARTICLE 12.	COORDINATION WITH OTHER CONTRACTORS	15
ARTICLE 13.	EXTENSION OF TIME FOR PERFORMANCE	16
ARTICLE 14.	COMPLETION AND FINAL ACCEPTANCE OF THE WORK	19
ARTICLE 15.	LIQUIDATED DAMAGES	20
ARTICLE 16.	OCCUPATION OR USE PRIOR TO COMPLETION	20

CHAPTER IV

SUBCONTRACTS AND ASSIGNMENTS

ARTICLE 17.	SUBCONTRACTS	20
ARTICLE 18.	ASSIGNMENTS	22

**CITY OF NEW YORK
STANDARD CONSTRUCTION CONTRACT**

TABLE OF CONTENTS

**CHAPTER V
CONTRACTOR'S SECURITY AND GUARANTY**

ARTICLE 19.	SECURITY DEPOSIT	23
ARTICLE 20.	PAYMENT GUARANTEE	23
ARTICLE 21.	RETAINED PERCENTAGE	25
ARTICLE 22.	INSURANCE	25
ARTICLE 23.	MONEY RETAINED AGAINST CLAIMS	30
ARTICLE 24.	MAINTENANCE AND GUARANTY	31

**CHAPTER VI
CHANGES, EXTRA WORK AND DOCUMENTATION OF CLAIM**

ARTICLE 25.	CHANGES	32
ARTICLE 26.	METHODS OF PAYMENT FOR OVERRUNS AND EXTRA WORK	32
ARTICLE 27.	RESOLUTION OF DISPUTES	34
ARTICLE 28.	RECORD KEEPING FOR EXTRA OR DISPUTED WORK	38
ARTICLE 29.	OMITTED WORK	39
ARTICLE 30.	NOTICE AND DOCUMENTATION OF COSTS AND DAMAGES; PRODUCTION OF FINANCIAL RECORDS	39

**CHAPTER VII
POWERS OF THE RESIDENT ENGINEER, THE ENGINEER
OR ARCHITECT AND THE COMMISSIONER**

ARTICLE 31.	THE RESIDENT ENGINEER	40
ARTICLE 32.	THE ENGINEER OR ARCHITECT OR PROJECT MANAGER	41
ARTICLE 33.	THE COMMISSIONER	41
ARTICLE 34.	NO ESTOPPEL	42

**CHAPTER VIII
LABOR PROVISIONS**

ARTICLE 35.	EMPLOYEES	42
ARTICLE 36.	NO DISCRIMINATION	43
ARTICLE 37.	LABOR LAW REQUIREMENTS	45
ARTICLE 38.	PAYROLL REPORTS	49
ARTICLE 39.	DUST HAZARDS	50

**CITY OF NEW YORK
STANDARD CONSTRUCTION CONTRACT**

TABLE OF CONTENTS

**CHAPTER IX
PARTIAL AND FINAL PAYMENTS**

ARTICLE 40.	CONTRACT PRICE	50
ARTICLE 41.	BID BREAKDOWN ON LUMP SUM	50
ARTICLE 42.	PARTIAL PAYMENTS	50
ARTICLE 43.	PROMPT PAYMENT	51
ARTICLE 44.	SUBSTANTIAL COMPLETION PAYMENT	51
ARTICLE 45.	FINAL PAYMENT	52
ARTICLE 46.	ACCEPTANCE OF FINAL PAYMENT	53
ARTICLE 47.	APPROVAL BY ART COMMISSION	54

**CHAPTER X
CONTRACTOR'S DEFAULT**

ARTICLE 48.	COMMISSIONER'S RIGHT TO DECLARE CONTRACTOR IN DEFAULT	54
ARTICLE 49.	EXERCISE OF THE RIGHT TO DECLARE DEFAULT	55
ARTICLE 50.	QUITTING THE SITE	55
ARTICLE 51.	COMPLETION OF THE WORK	55
ARTICLE 52.	PARTIAL DEFAULT	56
ARTICLE 53.	PERFORMANCE OF UNCOMPLETED WORK	56
ARTICLE 54.	OTHER REMEDIES	56

**CHAPTER XI
MISCELLANEOUS PROVISIONS**

ARTICLE 55.	CONTRACTOR'S WARRANTIES	57
ARTICLE 56.	CLAIMS AND ACTIONS THEREON	57
ARTICLE 57.	INFRINGEMENT	58
ARTICLE 58.	NO CLAIM AGAINST OFFICERS, AGENTS OR EMPLOYEES	58
ARTICLE 59.	SERVICES OF NOTICES	58
ARTICLE 60.	UNLAWFUL PROVISIONS DEEMED STRICKEN FROM CONTRACT	58
ARTICLE 61.	ALL LEGAL PROVISIONS DEEMED INCLUDED	58
ARTICLE 62.	TAX EXEMPTION	58
ARTICLE 63.	INVESTIGATION(S) CLAUSE	60
ARTICLE 64.	TERMINATION BY THE CITY	62
ARTICLE 65.	CHOICE OF LAW, CONSENT TO JURISDICTION AND VENUE	64

**CITY OF NEW YORK
STANDARD CONSTRUCTION CONTRACT**

TABLE OF CONTENTS

**CHAPTER XI (CONT'D)
MISCELLANEOUS PROVISIONS**

ARTICLE 66.	PARTICIPATION IN AN INTERNATIONAL BOYCOTT	65
ARTICLE 67.	LOCALLY BASED ENTERPRISE PROGRAM	65
ARTICLE 68.	ANTITRUST	66
ARTICLE 69.	MACBRIDE PRINCIPLES PROVISIONS	66
ARTICLE 70.	HEALTH INSURANCE COVERAGE	68
ARTICLE 71.	PROHIBITION OF TROPICAL HARDWOODS	68
ARTICLE 72.	CONFLICTS OF INTEREST	68
ARTICLE 73.	MERGER CLAUSE	68
ARTICLE 74.	STATEMENT OF WORK	68
ARTICLE 75.	COMPENSATION TO BE PAID TO CONTRACTOR	69
ARTICLE 76.	ELECTRONIC FUNDS TRANSFER	69
ARTICLE 77.	PARTICIPATION BY MINORITY-OWNED AND WOMEN-OWNED ENTERPRISES IN CITY PROCUREMENT	70
SIGNATURES		75
ACKNOWLEDGMENT BY CORPORATION		76
ACKNOWLEDGMENT BY PARTNERSHIP		76
ACKNOWLEDGMENT BY INDIVIDUAL		76
ACKNOWLEDGMENT BY COMMISSIONER		77
AUTHORITY		78
COMPTROLLER'S CERTIFICATE		78
MAYOR'S CERTIFICATE		79
PERFORMANCE BOND #1		80
PERFORMANCE BOND #2		84
PAYMENT BOND		88

CITY OF NEW YORK

STANDARD CONSTRUCTION CONTRACT (September 2008)

The Standard Construction Contract dated September 2008 (the "Contract") is amended as set forth below.

- Article 77: Article 77, Part A, Section 5 is deleted in its entirety and replaced with the following:
 5. Where a Subcontractor 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. **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 a contract that is subject to a Project Labor Agreement] where the bidder is required to identify at the time of bid submission its intended subcontractors for the Wicks trades [i.e., 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 of the Wicks trades, regardless of what point in the life of the contract such subcontracts will occur, at the time of bid submission. In the event that the Contractor's selection of a subcontractor is disapproved, the Contractor shall have a reasonable time to propose alternate subcontractors.**
- Article 77: Article 77, Part A, Section 11 is deleted in its entirety and replaced with the following:
 11. **Modification of Subcontractor Utilization Plan.** A Contractor may request a modification of its Subcontractor Utilization Plan (Subcontractor Participation Goals) 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 a contract that is subject to a Project Labor Agreement] where the bidder is required to identify at the time of bid submission its intended subcontractors for the Wicks trades [i.e., 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 Subcontractor Utilization Plan as part of its bid submission. The Agency may grant a request for Modification of a Contractor's Subcontractor 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 Subcontractor Participation Goals. In making such determination, Agency shall consider evidence of the following efforts, as applicable, along with any other relevant factors:**

Sub-paragraphs (a) through (h) remain unchanged.

THIS PAGE INTENTIONALLY LEFT BLANK

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 content 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 this Contract:

1.1.1 All provisions required by law to be inserted in this Contract, whether actually inserted 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 and Proposal For Bids; Bid or Proposal, and, if used, the Bid Booklet;

1.1.6 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.

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 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.

2.1.4 "City" shall mean the City of New York.

2.1.5 **"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.

2.1.6 **"Commissioner"** shall mean the head of the Agency that has entered into this Contract, or his/her duly authorized representative.

2.1.7 **"Comptroller"** shall mean the Comptroller of the City of New York.

2.1.8 **"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.

2.1.9 **"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.

2.1.10 **"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.

2.1.11 **"Contractor"** shall mean the entity which executed this Contract, whether a corporation, firm, partnership, joint venture, individual, or any combination thereof, and it(s), 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.

2.1.12 **"Days"** shall mean calendar days, except where otherwise specified.

2.1.13 **"Engineer" or "Architect" or "Project Manager"** shall mean the person so designated in writing by the Commissioner to act as such in relation to this Contract, including a private Architect or Engineer or Project Manager, as the case may be.

2.1.14 **"Engineering Audit Officer" (EAO)** shall mean the person so designated by the Commissioner to perform responsible auditing functions hereunder.

2.1.15 **"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.

2.1.16 **"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.

2.1.17 **"Final Acceptance"** shall mean final written acceptance of all the Work by the Commissioner, a copy of which shall be sent to the Contractor.

2.1.18 **"Final Approved Punch List"** shall mean a list, approved in writing by the Engineer, specifying those items of Work to be completed by the Contractor after Substantial Completion and dates for the completion of each item of Work.

2.1.19 **"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.

2.1.20 **"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.

2.1.21 **"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.

2.1.22 **"Other Contractor(s)"** shall mean any Contractor (other than the entity which executed this Contract or its Subcontractors) who has a contract with the City for work on or adjacent to the building or site of the Work.

2.1.23 **"Payroll Taxes"** shall mean State Unemployment Insurance ("SUI"), Federal Unemployment Insurance (FUI") and payments pursuant to the Federal Insurance Contributions Act ("FICA").

2.1.24 **"Project"** shall mean the public improvement to which this Contract relates.

2.1.25 **"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.

2.1.26 **"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.

2.1.27 **"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.

2.1.28 **"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.

2.1.29 **"Specifications"** shall mean all of the directions, requirements and standards of performance applying to the Work as hereinafter detailed and designated under the Specifications.

2.1.30 **"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, at the site. Wherever the word Subcontractor appears, it shall also mean Sub-Subcontractor.

2.1.31 **"Substantial Completion"** shall mean the written determination by the Commissioner that the Work required under this Contract is substantially, but not entirely, complete.

2.1.32 **"Treasurer"** shall mean the Commissioner of the Department of Finance of the City of New York.

2.1.33 **"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 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 and design 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**, or his/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 right to 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 Department of Environmental Protection.

5.3.2 The Contractor agrees to comply with Section 24-219 of the Administrative Code of the City ("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 work 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 New York City Department of Environmental Protection. In addition, the Contractor's certified Construction Noise Mitigation Plan is subject inspection by the Department of Environmental Protection in accordance with 15 RCNY §28-101. No Contract work may take place at a worksite 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 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 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.

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 to fulfill the requirements of this Article 5.4.2, where the Commissioner of the New York 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 City agencies and Contractors. Any such determination shall expire after six months unless renewed.

5.4.2(c) Contractors shall not be required to comply with this Article 5.4.2 where the 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 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 is available. Any finding made pursuant to this subdivision shall expire after sixty days, at which time the requirements of this Article 5.4.2 shall be in full force and effect unless the 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 Agency issuing this solicitation.

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 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 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 calendar 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)(1) Where the 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 those paragraphs is unavailable for such vehicle, Contractor shall use whatever technology for reducing the emission of pollutants, if any, is available and appropriate for such vehicle.

5.4.3(d)(2) 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, 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)(3) In determining which technology to use for the purposes of Articles 5.4.3(d)(1) and 5.4.3(d)(2) above, 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)(4) Contractors 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 Agency issuing the solicitation. Any finding or waiver made or issued pursuant to Articles 5.4.3(d)(1) and 5.4.3(d)(2) above shall expire after one hundred eighty days, at which time the requirements of Article 5.4.3(a) shall be in full force and effect unless the 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. Contractors 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) 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 and ten thousand 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 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 Department the following information:

5.4.6(1) The total number of diesel-powered Nonroad Vehicles used to fulfill the requirements of this Public Works Contract;

5.4.6(2) The number of such Nonroad Vehicles that were powered by Ultra Low Sulfur Diesel Fuel;

5.4.6(3) 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(4) 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(5) The locations where such Nonroad Vehicles were used; and

5.4.6(6) 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.

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 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 of New York 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 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 terms shall not apply to horticultural maintenance vehicles used for landscaping purposes that are powered by a Nonroad Engine of sixty-five horsepower 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.

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 horsepower (HP) rating of 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.

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; NOTICES AND 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 the persons and 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 notify in writing the commercial general liability insurance carrier, and, where applicable, the worker's compensation and/or other insurance carrier, of any such loss, damage, injury, or accident, and any claim or suit arising therefrom, immediately, but not later than 20 days after such event. The **Contractor's** notice to the commercial general liability insurance carrier must expressly specify that "this notice is being given on behalf of the City of New York as Additional Insured as well as [the Contractor] as Named Insured." The **Contractor's** notice to the insurance carrier shall contain the following information: the name of the **Contractor**, the number of the **Contract**, the date of the occurrence, the location (street address and borough) of the occurrence, and the identity of the persons or things injured, damaged or lost.

7.3.2(a) At the time notice is provided to the insurance carrier(s), the **Contractor** shall provide copies of such notice to the **Comptroller** and the **Commissioner**. Notice to the **Comptroller** shall be sent to the Insurance Unit, NYC Comptroller's Office, 1 Centre Street – Room 1222, New York, New York, 10007. Notice to the **Commissioner** shall be sent to the address set forth in Schedule A of the General Conditions.

7.3.2(b) If the **Contractor** fails to provide any of the foregoing notices to any appropriate 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 indemnify, defend and hold the **City**, its employees and agents (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 or contributing 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 **Contractor** waives all rights against the **City** for any damages or losses for which either is covered under any insurance required under Article 22 (whether or not such insurance is actually procured) or any other insurance applicable to the operations of the **Contractor** and/or its **Subcontractors** in the performance of this **Contract**.

7.6 The provisions of this Article 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 **Work** on the date specified in a written notice signed by the **Commissioner**. The time for performance of the **Work** under the **Contract** shall be computed from the date specified in such written notice. **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 herein, 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 with this **Contract**, unless otherwise directed by the **Engineer**, shall submit to the **Engineer** a proposed progress schedule in 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 various operations 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**; 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** 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 enable 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 seven (7) **Days** after the commencement of such condition, the **Contractor** must notify the **Engineer** 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.

11.1.2 If the **Contractor** shall claim to be sustaining damages for delay as provided for in this Article, within forty-five (45) **Days** from the time such damages are first incurred, and every thirty (30) **Days** thereafter for as long as such damages are being incurred, the **Contractor** shall submit to the **Commissioner** verified written statements of the details and the amounts of such damages, together with documentary evidence of such damages, ("statement of delay damages") as further detailed in Section 11.6. 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. On failure of the **Contractor** to fully comply with all of 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 arising under or by reason of this **Contract** shall not be different from or in excess of the statements made and documentation provided pursuant to this article.

11.1.3 Within 60 days of submission of the final verified statement of claims pursuant to Article 44, the **Commissioner** shall make a determination as to whether a compensable

delay has occurred and, if so, the amount of compensation due the **Contractor**. Notwithstanding the above, the **Commissioner** may make a determination as to whether a compensable delay has occurred at any time after the **Contractor's** first submission of a statement of delay damages.

11.2 Failure of the **Contractor** to strictly comply with the requirements of Article 11.1.1 may, in the 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 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 delay in the performance of this **Contract** necessarily extending the time for completion of the **Work** or resulting from acceleration directed by the City and required to maintain the project 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**, 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 Extended delays attributable to the City in the review or issuance of change orders, in shop drawing reviews and approvals or as a result of the cumulative impact of multiple change orders, which have a verifiable impact on project costs.

11.4.1.3 The unavailability of the site for an extended period of time that significantly affects the scheduled completion of the **contract**.

11.4.1.4 The issuance by the **Engineer** of a stop work order relative to a substantial portion of work for a period exceeding thirty days, that was not brought about through any action or omission of the **Contractor**.

11.4.1.5 Differing site conditions that were not known or 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 The provisions of this Article 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 section shall be allowed.

11.5 Non-Compensable Delays. The **Contractor** agrees to make no monetary request for, and has 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 generally recognized 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 action or omission by the **City**;

11.5.4 Any labor boycott, strike, picketing or similar situation;

11.5.5 Any shortages of supplies of materials 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 war or of the public enemy or terrorist acts;

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 dates of the claimed periods of delay and, in addition, a description of the operations that were delayed, the reasons for the delay and an explanation of how they were delayed.

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 amount of additional compensation sought and a breakdown of that amount into categories as described in Article 26.2, subject to the limitations set forth in section 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 Labor;

11.7.1.2 Materials;

11.7.1.3 Equipment;

- 11.7.1.4 Extended Field Office Costs;
 - 11.7.1.5 Extended Contract Site Overhead;
 - 11.7.1.6 Extended Home office overhead; and
 - 11.7.1.7 Insurance and Bond Costs.
- 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 11.7.1.1 through 11.7.1.6, and an additional overhead of 5% of the costs outlined in 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;
 - 11.7.3.2 Consequential damages, including but not limited to interest on monies in dispute, including interest which is paid on such monies, 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;
 - 11.7.3.4 Direct or indirect costs attributable to performance of work where the **Contractor**, because of situations or conditions within its control, has not progressed the work in a satisfactory manner; and
 - 11.7.3.5 Attorneys' fees and dispute and claims preparation expenses.
- 11.8 Determinations 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 If the parties agree that a compensable delay has occurred and agree on the amount of compensation, payment may be made pursuant to a written change order, subject to pre-audit by the **Engineering Audit Officer**, and may be post-audited by the **Comptroller** and/or the **Department**.

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** shall determine 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. Except as provided for in Article 11.4.1.1, the **Contractor** agrees to make no claim against the **City** for

any damages relating to or arising out of any timely directions issued by the **Engineer** pursuant to this article (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 this **Contractor's** failure to comply with the **Engineer's** direction 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 **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 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 suit based upon such claim and if any judgment or claims (even if the allegations of the suit 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 and the **PPB Rules**.

13.2 Any extension of time may be granted only by the **Commissioner** 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 officers, 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 **Commissioner** 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 **Commissioner** 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 of delay resulting from such act, fault or omission.

13.5 The determination made by the **Commissioner** or the Board on an application for an extension of time shall be binding and conclusive on the **Contractor**.

13.6 The granting of an application for an extension of time for causes of delay other than those herein referred to shall be entirely within the discretion of the **Commissioner** or the Board.

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 **Commissioner** of the condition which allegedly has caused or is causing the delay, and shall submit a written application to the **Commissioner** 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 bid amount;

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 **Commissioner** 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 multiple of six (6) months involved beyond the one (1) year period; or

13.9.1(d) If exceptional circumstances exist, the **Commissioner** 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 **Commissioner** 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 **Commissioner**, 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 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** except as set forth in Article 11, and agrees that all it may be entitled to on account of any such delay for which compensation is not specifically provided for in Article 11 is an extension of time to complete performance of the **Work** as provided herein.

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 in Articles 14.2.1 and 14.2.2 have been met. The **Commissioner** will then issue a Certificate of **Substantial Completion**.

14.2.1 Inspection: The **Engineer** has inspected the **Work** and has made a written determination that it is substantially complete.

14.2.2 Approval of Final Punch List and Date for **Final Acceptance**: Following inspection of the **Work**, the **Engineer** shall furnish the **Contractor** a final punch list, specifying all items of **Work** to be completed. The **Contractor** shall then submit to the **Engineer** dates for the completion of each specified item of **Work**. Within a reasonable time after receipt, the **Engineer**, in a written notification to the **Contractor**, shall approve the **Contractor's** completion dates or, if they are unable to agree, 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 Determining the Date of **Final Acceptance**: The **Work** will be accepted as final and complete as of the date of the **Engineer's** inspection if, upon such inspection, the **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**.

14.4 Request for Inspection: Inspection of the **Work** by the **Engineer** for the purpose of **Substantial Completion** or **Final Acceptance** shall be made within ten (10) Days after receipt of the **Contractor's** written request therefor.

14.5 Request for Re-inspection: If upon inspection for the purpose of **Substantial Completion** or **Final Acceptance**, the **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** 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** shall be made within ten (10) Days after receipt of the **Contractor's** written request therefor.

14.6 Initiation of Inspection by the **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** may initiate such inspection or re-inspection.

ARTICLE 15. LIQUIDATED DAMAGES

15.1 In the event the **Contractor** fails to complete the **Work** within the time fixed for such 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 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 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 shall apply to the **Contractor** if it 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** 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 this article. In the event the **Commissioner** takes over, uses, occupies, or operates any part of the **Work**:

16.1.1 the **Commissioner** 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, 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 If an approved **Subcontractor** elects to subcontract any portion of its subcontract, the proposed subcontract shall be submitted in the same manner as directed above.

17.4 The **Commissioner** will notify the **Contractor** in writing whether the proposed **Subcontractor** is qualified or not qualified. If the proposed **Subcontractor** is not qualified, the **Contractor** may submit another proposed **Subcontractor** unless the **Contractor** decides to do the **Work**. No **Subcontractor** shall be permitted on the **Site** unless approved.

17.5 Before entering into any subcontract hereunder, the **Contractor** shall inform the **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**.

17.6 Documents given to a **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.

17.7 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.

17.8 The **Contractor** shall be responsible for ensuring that all **Subcontractors** performing **Work** at the **Site** have either their own insurance coverage or are covered by the **Contractor's** insurance as required by Article 22.

17.9 The **Contractor** shall promptly, upon request, file with the **Engineer** a conformed copy of the subcontract and its cost. The subcontract shall provide the following:

17.9.1 **Payment to Subcontractors:** The agreement between the **Contractor** and its **Subcontractors** 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**.

17.9.2 **Prevailing Rate of Wages:** The agreement between the **Contractor** and its **Subcontractors** shall include the prevailing wage rates and supplemental benefits to be paid in accordance with Labor Law Section 220.

17.9.3 **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 its **Subcontractors** in excess of \$50,000 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.).

17.10 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 adjusted.

17.11 On **Contracts** where 100% 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.

17.12 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, or conveyance shall not be valid until filed in the office of the **Commissioner** and the **Treasurer**, 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 or conveyance, 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 GUARANTY

ARTICLE 19. SECURITY DEPOSIT

19.1 The bid deposit, if required, shall be retained by the **Comptroller** as security for the **Contractor's** faithful performance of the **Contract** and will be returned to the **Contractor** only after the sum retained under Article 21 equals the amount of the bid deposit, subject to the other provisions of this **Contract**. If performance and payment bonds are required, any bid security posted shall be returned within a reasonable time after posting of such bonds and execution of this **Contract** by the **City**. When no partial payments are provided, the bid deposit will be released when final payment is certified to the **Comptroller** for payment.

19.2 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**:

19.2.1 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

19.2.2 To indemnify the **City** against any and all claims.

ARTICLE 20. PAYMENT GUARANTEE

20.1 On **Contracts** where 100% performance bonds and payment bonds are executed, this article does not apply.

20.2 In the event the terms of this **Contract** do not require the **Contractor** to provide a payment bond, the **City** shall, in accordance with the terms of this article, guarantee payment of all lawful demands 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 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 this Article 20.3.

20.3.2 Nothing in this article 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**.

20.3.3 All demands made against the **City** pursuant to this article shall be made within four (4) months from the date payment is due on the invoice or invoices submitted by the beneficiary to the **Contractor** for labor or **Work** done or for materials or supplies delivered, or, if the demand is for wages, four (4) months from the date the wages were due to be paid to the beneficiary.

20.3.4 All demands made against the **City** by such beneficiary shall be presented to the **Engineer** along with all written documentation concerning the demand which the **Engineer** deems 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.

20.3.5 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.

20.3.6 The **City** will not initiate the payment process of this article or make payment on a demand where the beneficiary making the demand has filed a lien against the **Work** or otherwise sues the **City** prior to receiving a written notice from the **City** that it will not pay the demand.

20.3.7 No beneficiary shall be entitled to interest from the **City**, or to any other costs, including, but not limited to, attorney's fees.

20.4 Upon the receipt by the **City** of a demand pursuant to this article, 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.

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**.

20.4.2 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 lien has been filed, the terms and conditions set forth in Article 23 shall apply.

20.5 The provisions of this article 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, 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 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 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 his **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 within the one year limitations period set forth in Section 137(4)(b).

ARTICLE 21. RETAINED PERCENTAGE

21.1 If this **Contract** requires 100% 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 100% performance and payment security and if the price for which this **Contract** was awarded does not exceed \$500,000, then as further security for the faithful performance of this **Contract**, the **Commissioner** shall deduct, and retain until the substantial completion of the **Work**, ten (10%) percent of the value of **Work** certified for payment in each partial payment voucher.

21.3 If this **Contract** does not require 100% performance and payment security and if the price for which this **Contract** was awarded exceeds \$500,000, 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: 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**), the **Contractor** shall effect 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 issued by companies that meet the standards of Article 22.2.1 and shall be primary (and non-contributing) to any insurance or self-insurance maintained by the **City**.

22.1.1 Commercial General Liability Insurance: The **Contractor** shall provide a Commercial General Liability Insurance policy covering the **Contractor** as Named Insured and the **City** as an Additional Insured. This policy shall protect the **City** and the **Contractor** from claims for property damage and/or bodily injury, including death, which may arise from any of the operations under this **Contract**. Coverage under this policy shall be at least as broad as that provided by ISO Form CG 0001 (10/01 ed.), must be "occurrence" based rather than "claims-made", and shall 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, Medical Payments, Independent Contractors, Personal Injury (Contractual Exclusion deleted), Explosion, Collapse and Underground Property, and Incidental Malpractice. If such insurance contains an aggregate limit, it shall apply separately to this **Project**.

22.1.1(a) Such Commercial General Liability Insurance shall name the City, together with its officials and employees, as an Additional Insured under this policy. Coverage for the City as Additional Insured shall specifically include the City's officials and employees, and shall be at least as broad as either Insurance Services Office ("ISO") Form CG 20 10 (07/04 ed.) or Form CG 20 33 (07/04 ed.) and shall provide completed operations coverage at least as broad as CG 20 37 (07/04 ed.).

22.1.1(b) If this **Contract** is equal to or greater than Ten Million Dollars (\$10,000,000.00), each Commercial General Liability Insurance policy provided shall contain each of the following endorsements:

22.1.1(b)(i) The Duties in the Event of Occurrence, Claim or Suit condition of the policy is amended per the following: If and insofar as knowledge of an "occurrence", "claim", or "suit" is relevant to the City of New York as Additional Insured under this policy, such knowledge by an agent, servant, official, or employee of the City of New York will not be considered knowledge on the part of the City of New York of the "occurrence", "claim", or "suit" unless the following position shall have received notice thereof from such agent, servant, official, or employee: Insurance Claims Specialist, Affirmative Litigation Division, New York City Law Department; and

22.1.1(b)(ii) Any notice, demand or other writing by or on behalf of the Named Insured to the Insurance Company shall also be deemed to be a notice, demand, or other writing on behalf of the City as Additional Insured. Any response by the Insurance Company to such notice, demand or other writing shall be addressed to Named Insured and to the City at the following addresses: Insurance Unit, NYC Comptroller's Office, 1 Centre Street - Room 1222, New York, N.Y. 10007; and Insurance Claims Specialist, Affirmative Litigation Division, New York City Law Department, 100 Church Street, New York, NY 10007.

22.1.2 Workers' Compensation Insurance and Disability Benefits Insurance: The **Contractor** shall provide, and ensure that each **Subcontractor** provides, Workers Compensation 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 qualifying for insurance pursuant to Article 22.1.4).

22.1.3 Employers' Liability Insurance: The **Contractor** shall provide, and ensure that each **Subcontractor** provides, Employers Liability Insurance affording compensation due to bodily injury by accident or disease sustained by any employee arising out of and in the course of his/her employment under this **Contract** (except for those qualifying for insurance pursuant to Article 22.1.4).

22.1.4 United States Longshoremen's and Harbor Workers Act and/or Jones Act Insurance: The **Contractor** shall provide, and ensure that each **Subcontractor** provides, 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**.

22.1.5 Builders' Risk Insurance: The **Contractor** shall provide a Builders' Risk Insurance policy covering all risks in completed value form. Such policy shall cover the total value of the **Work** performed in accordance with Schedule A, as well as the value of any equipment, supplies and/or material for the **Project** that may be in storage (on or off the **Site**) or in transit. The policy shall cover the cost of removing debris, including demolition as may be legally necessary by the operation of any law, ordinance or regulation, and for loss or damage to any owned, borrowed, leased or rented capital equipment, tools, including tools of their agents and employees, staging towers and forms,

and property of the **City** held in their care, custody and/or control. Such policy shall name as insureds the **City**, the **Contractor**, and its **Subcontractors**. The Builders' Risk policy shall contain the following endorsements:

22.1.5(a) The **City** and the **Contractor** shall be named as loss payee for the **Work** in order of precedence, as their interest may appear; and

22.1.5(b) In the event the loss occurs at an occupied facility, the policy shall permit occupancy without the consent of the Insurance Company; and

22.1.5(c) In the event that the insurance policy has been issued by a mutual insurance company, the following language shall be included: "The City of New York is not liable for any premium or assessment under this policy of insurance. The First Named Insured is solely liable therefor."

22.1.6 Comprehensive Business Automobile Liability Insurance: The **Contractor** shall provide a Comprehensive Business Automobile Liability policy for liability arising out of any owned, non-owned, leased and hired vehicles to be used in connection with this **Contract**. Coverage should be at least as broad as ISO Form CA0001, ed. 10/01.

22.1.6(a) If autos 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.

22.1.7 Pollution/Environmental Liability Insurance: The **Contractor** shall provide Pollution/Environmental Liability Insurance covering bodily injury and property damage, including loss of use of damaged property or of property that has not been physically injured. 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, suit, or proceedings against the **City** arising from the operations under this **Contract**. Such insurance shall be in the **Contractor's** name and list the **City** as an Additional Insured. Coverage for the **City** as Additional Insured shall specifically include the **City's** officials and employees, and shall be at least as broad as provided to the **Contractor** for this **Project**.

22.1.7(a) If such coverage 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 years from the time the **Work** under this **Contract** is completed.

22.1.8 Marine Insurance:

22.1.8(a) Marine Protection and Indemnity Insurance: The **Contractor** shall provide a Marine Protection and Indemnity policy with coverage at least as broad as policy form SP-23. The policy shall provide coverage for the **Contractor** and for the **City** (together with its officials and employees) as Additional Insured for bodily injury and property damage arising from marine operations under this **Contract** including injury or death of crew members (if not fully provided through other insurance), damage to piers, wharves and other fixed or movable structures and loss of or damage to any other vessel or craft, or to property on such other vessel or craft, not caused by collision.

22.1.8(b) Ship Repairers Legal Liability Insurance: The **Contractor** shall provide a Ship Repairers Legal Liability Insurance policy covering all repair operations under this **Contract** at

or in the vicinity of a designated approved port or yard under this **Contract**. The policy shall provide coverage from the point of acceptance of care custody and control of any **City** vessel. The policy shall provide Bailee Coverage for any **City** vessel in the **Contractor's** care, custody and control and coverage for damage to property of others caused by any **City** vessel in the **Contractor's** care custody and control.

22.1.8(c) Collision Liability/Towers Liability Insurance: The **Contractor** shall provide a Collision Liability/Towers Liability Insurance policy with coverage for the **Contractor** and for the **City** (together with its officials and employees) as Additional Insured at least as broad as the American Institute Tug Form (08/01/76) for all tugs used under this **Contract** and Collision Liability per American Institute Hull Clauses (6/2/77).

22.1.8(d) Marine Pollution Liability Insurance: The **Contractor** shall provide a Marine Pollution Liability Insurance policy covering itself as Named Insured and the **City** (together with its officials and employees) as Additional Insured for 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. Coverage under this policy shall be at least as broad as that provided by Water Quality Insurance Syndicate Form (09/98 ed.).

22.1.9 The **Contractor** shall provide such other types of insurance, at such minimum limits, as are specified in Schedule A of the General Conditions.

22.2 General Requirements for Insurance 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 AA, unless prior written approval is obtained from the Mayor's Office of Operations.

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 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 All required insurance policies, except for insurance required pursuant to Sections 22.1.2, 22.1.3, and 22.1.4, shall contain the following endorsement: "This policy may not be cancelled, terminated, modified or changed unless thirty (30) days prior written notice is sent by the Insurance Company to the Named Insured (or First Named Insured, as appropriate), the **Commissioner**, and to the **Comptroller**, attn: Office of Contract Administration, Municipal Building, Room 1005, New York, New York 10007."

22.3 Proof of Insurance:

22.3.1 Within ten (10) **Days** of award, the **Contractor** shall, for each policy required under this **Contract**, except for Workers Compensation Insurance and Disability Benefits Insurance and builders' risk insurance, file a Certificate of Insurance with the **Commissioner** pursuant to Article 22.6. For Workers' Compensation Insurance and Disability Benefits Insurance, the **Contractor** shall file proof of insurance in a form acceptable to the **Commissioner** within ten (10) **Days** of award. Accord forms are not acceptable proof of workers' compensation coverage. The Contractor must submit one of the following forms to the Department, or another form acceptable to the Department: C-105.2 -- Certificate of Workers' Compensation Insurance, or U-26.3 -- State Insurance Fund Certificate of Workers' Compensation Insurance. For builders' risk insurance, the **Contractor** shall file a Certificate of Insurance with the **Commissioner** at the direction of the **Commissioner** but in any event no later than ten (10) **Days** prior to commencement of the **Work**.

22.3.1(a) All Certificates of Insurance shall be in a form acceptable to the **City** and shall certify the issuance and effectiveness of the types of insurance specified in Schedule A, each with the specified minimum limits and evidence of the compliance with the Additional Insured or Named Insured provisions of Articles 22.1.1(a), 22.1.5, 22.1.7, and 22.1.8, as applicable. All Certificate(s) of Insurance shall be accompanied by either a duly executed "Certification by Broker" in the form contained in Part II of Schedule A or completed copies of all policies referenced in the Certificate of Insurance. In the absence of completed policies, binders are acceptable.

22.3.2 Certificates of Insurance confirming renewals of insurance shall be submitted to the **Commissioner** prior to the expiration date of coverage of policies required under this **Contract**. Such Certificates of Insurance shall comply with the requirements of Article 22.3.1(a) and, if applicable, Article 22.3.1(b).

22.3.3 The **Contractor** shall be obligated to provide the **City** with a copy of any policy required by this Article 22 upon the demand for such policy by the **Commissioner** or the New York City Law Department.

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 hereunder does not excuse the **Contractor** from securing a policy consistent with all provisions of this Article or of any liability arising from its failure to do 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.

22.5 The **City** as Additional Insured or Loss Payee under **Subcontractors'** Insurance. The Contractor shall ensure that each **Subcontractor** name the **City** as Additional Insured or loss payee, as appropriate, under all

policies covering **Work** performed by such **Subcontractor** under this **Contract**. The **City's** coverage as Additional Insured shall include the **City's** officials and employees and be at least as broad as that provided to the **Contractor**. The foregoing requirements shall not apply to insurance provided pursuant to Articles 22.1.2, 22.1.3, and 22.1.4.

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 If the **Contract** involves disposal of hazardous materials, the **Contractor** shall dispose such materials only at sites where the disposal site operator maintains Pollution Legal Liability Insurance in the amount of at least \$2,000,000 for losses arising from such disposal site.

22.8 Materiality/Non-Waiver: The **Contractor's** failure to secure policy(ies) in complete conformity with this Article, or to give the Insurance Company timely notice of any sort required in this **Contract** on behalf of the **City**, or to do anything else required by this Article 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.

22.9 Other Remedies: Insurance coverage in the minimum amounts provided for herein shall not relieve the **Contractor** or **Subcontractors** of any liability under this **Contract**, nor shall it preclude the **City** from exercising any rights or taking such other actions as are 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., as referred 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, and return the balance, if any, without interest, to the **Contractor**.

23.3 Liens: If at any time before or within thirty (30) Days after the **Work** is completed and accepted by the **City**, any persons claiming to have performed any labor or furnished any material toward the performance or completion of this **Contract**, shall file with the **Agency** and with the **Treasurer** any notice as is described in the

New York State Lien Law, or any act of the Legislature of the State of New York, the City shall retain, from the monies due or to become due under this Contract, so much of such monies as shall be sufficient to pay the amount claimed in said notice, together with the reasonable costs of any action or actions brought or that may be brought to enforce such lien. The monies so retained shall be held by the City until the lien thereon created by the said act and the filing of the said notice shall be discharged pursuant to Law.

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 guarantee are provided for.

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 by authorizing 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 expiration of 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 or lessees of the premises.

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 **Laws** 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 in the 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 to a 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 **Department**.

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 for that 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 a time and material basis 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 on a time and material basis 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.

26.2.1 Necessary materials (including transportation to the **Site**); plus

26.2.2 Necessary direct labor, including payroll taxes 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, 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: $(.035) \times (\text{HP rating}) \times (\text{Fuel cost/gallon})$. 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 PRIMEDIA (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 PRIMEDIA (the "Blue Book"). The reasonable rental value is 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 percent of such rental rates; second shift shall be sixty percent of the first shift rate; and third shift shall be forty percent of the first shift rate. Equipment on standby shall be reimbursed at one-third the prorated monthly rental rate. **Contractor**-owned equipment includes equipment from rental companies affiliated with or controlled by the **Contractor**, as determined by the **Commissioner**. In establishing cost reimbursement for non-operating contractor-owned 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 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 Reasonable rental costs of non-**Contractor**-owned 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: $(.035) \times (\text{HP rating}) \times (\text{Fuel cost/gallon})$. 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

26.2.7 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 shall be based upon the Manual Rate for such insurance for the applicable work classifications/codes, in accordance with the most recent schedule promulgated by the New York Compensation Insurance Rating Board; plus

26.2.8 Additional costs incurred as a result of the **Extra Work** for performance and payment bonds; plus

26.2.9 Ten (10%) 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

26.2.10 Ten (10%) percent of the total of items in Articles 26.2.1 through 26.2.5, plus item 26.2.9, 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

26.2.11 Five (5%) percent of the total of items in Article 26.2.6, 26.2.7, and 26.2.8 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**. The cost of such **Extra Work** and of such omitted or reduced **Work** shall be computed based upon applicable **Contract** unit prices. Where there are no applicable **Contract** unit prices, the cost of such **Extra Work** and of such omitted or reduced **Contract Work** shall be computed in accordance with items 26.2.1 through 26.2.8. If the cost of such **Extra Work** exceeds the costs of such omitted or reduced **Contract Work**, the **Contract** price shall be increased by the difference, plus percentages for overhead and profit as provided in Articles 26.2.9 through 26.2.11. If the cost of the omitted or reduced **Contract Work** exceeds the cost of the **Extra Work**, then the **Contract** price shall be reduced by the difference.

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 that arise under, or by virtue of, this **Contract** shall be finally resolved in accordance with the provisions of this article 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 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 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 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 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, 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** in the 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 disputed 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 **Contractor** thus brought into the dispute resolution proceeding shall have the same rights and obligations under this article 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 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. 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 **Agency 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 section 7-201 and 7-203 of the New York City 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 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 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;

27.6.1.1 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

27.6.2 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, 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 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 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 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 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 Corporation Counsel, the Director of the Office of Construction, 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 Laws 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.

27.8 Any termination, cancellation, or alleged breach of the **Contract** prior to or during the pendency of any proceedings pursuant to this article 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.

ARTICLE 28. RECORD KEEPING FOR EXTRA OR DISPUTED WORK

28.1 While the **Contractor** or any of its **Subcontractors** is performing **Extra Work** on a Time and Material Basis ordered by the **Commissioner** under Article 25, or is performing disputed **Work**, or complying with a determination or order under protest in accordance with Articles 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 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 with respect to such **Extra** 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 for as long as such damages are incurred, 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 fully 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.

30.2 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, 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, 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, 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** or **Comptroller** 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** or **Comptroller** 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.

30.5 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 is not complied with as required, then the **Contractor** hereby consents to the dismissal of the action or dispute resolution procedure.

CHAPTER VII

POWERS OF THE RESIDENT ENGINEER, THE ENGINEER OR ARCHITECT 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 by the **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 issue an **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** 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**, officer, 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 **Resident Engineer**, or any other officer, 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 dollars, all laborers, workers, and mechanics employed in the performance of the **Contract** 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 hours in duration.

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 qualified and 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.

36.1.5 The aforesaid provisions of this article covering every **Contract** for or on behalf of the State or a municipality for the manufacture, sale or distribution of materials, equipment or supplies shall be limited to operations performed within the territorial limits of the State of New York.

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 repair of 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 section 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 applicant for 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, rates of 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 all information and reports including an Employment Report before the award of the **Contract** which are required by E.O. 50, the Rules and Regulations promulgated thereunder, and orders of the 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.

Failure to comply with E.O. 50 and the rules and regulations promulgated thereunder, in one or more instances, may result in the **Agency** declaring the **Contractor** to be non-responsible.

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 Administrative Code, that:

36.5.1 The **Contractor** will not engage in any unlawful discriminatory practice in violation of Title VIII of the Administrative Code;

36.5.2 every agreement between the **Contractor** and its **Subcontractors** in excess of \$50,000 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.); and

36.5.3 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 Section 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) calendar **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**. Minimum wages shall be the rates fixed by Federal **Law** and regulations.

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.

37.4 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 wage scale as provided in Labor Law Section 220, as amended, or

37.4.1(b) Less than 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) and Minimum Wages (Article 37.2.6), the party responsible therefore 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 suits brought by the Corporation Counsel in the name of the **City**, in addition to damage for any other breach of this **Contract**, 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 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 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, whether such failures were concurrent or consecutive and whether or not such final determinations concerning separate public work projects are rendered simultaneously, such **Contractor** or **Subcontractor** shall be ineligible to submit a bid on or be awarded any public work 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 work 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 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 as a 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 Notice of 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 which the **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 work 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 or she is working. If the total cost of the **Work** under this **Contract** is at least two hundred fifty thousand dollars, such notice shall also include a statement that, that each worker, laborer or mechanic 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 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, which signed statement shall be maintained with the payroll records required by this **Contract**; and

37.6.3.1 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:** Provide laminated identification badges which indicate the worker's, laborer's or mechanic's name, trade, employer's name and employment starting date (month/day/year). Further, require as a condition 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**; 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 in Article 37.6.1 in that language or languages as may be required. The **Contractor** is responsible for all distributions under 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 If this **Contract** is for an amount greater than \$1,000,000, 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 \$750,000, 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 used if 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** or **Subcontractor(s)** 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.

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 with the provisions of this article 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 for 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** shall maintain on the **Site** the original payrolls or transcripts thereof which the **Contractor** and its **Subcontractor(s)** are required to maintain pursuant to Labor Law Section 220. The **Contractor** and **Subcontractor(s)** shall submit original payrolls or transcripts, subscribed and affirmed by it as true, with each and every payment requisition. 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 original payrolls or transcripts thereof, subscribed and affirmed by it as true, and the statements signed by each worker pursuant to this Chapter VIII. In addition, the **Contractor** and **Subcontractor(s)** shall furnish to the **Engineer** upon written demand any other information to satisfy the **Engineer** that this Chapter VIII and the Labor Law, as to the hours of employment and rates of wages, are being observed. The **Contractor** shall maintain the payrolls or transcripts thereof for six (6) years from the date of completion of the **Work** on this **Contract**.

38.2 When directed by the **Engineer**, the **Contractor** or **Subcontractor** shall provide the **Engineer** with an attendance sheet for each **Day** on which **Work** is performed on the **Site**. Such attendance sheet shall be in a form acceptable to the **Agency** and shall provide information for employees of the **Contractor** and **Subcontractor(s)**.

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** void.

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 price or unit prices 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, unless otherwise directed by the **Resident Engineer**, the **Contractor** shall submit to 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 a month, 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 such satisfactory payment application, 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 **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 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 section 43.5 herein, then the **Contractor** shall pay interest on amounts due to such **Subcontractor** or **Materialman** at a 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 NY General Business Law. Accrual of interest shall commence on the day immediately following the expiration of the seventh day following receipt of payment to the **Contractor** by 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 suppliers 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 When the **Work** in the opinion of the **Commissioner**, has been substantially but not entirely completed, he/she shall issue a certificate of **Substantial Completion**.

44.2 The **Contractor** shall submit with the **Substantial Completion** requisition:

44.2.1 A Final Verified Statement of any and all alleged claims against the City and any pending dispute resolution procedures in accord with the **PPB Rules** and this **Contract**, 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.

44.2.1(a) With respect to each such claim, the **Commissioner**, the **Comptroller** and, in the event of litigation, the Corporation Counsel of the **City** 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 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, will have waived any such claims.

44.2.2 A Final Approved Punch List.

44.2.3 Where required, a request for a substantial or final extension of time.

44.3 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 where the **Contractor** shall fail 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.

44.4 No further partial payments shall be made to the **Contractor** after the **Commissioner** issues a Certificate of **Substantial Completion**, except the **Substantial Completion** payment and **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.

44.5 The **Contractor** acknowledges that nothing contained in this article 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. 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 and all alleged claims against the **City**, and any pending dispute resolution procedures in accord with the **PPB Rules** and this **Contract**, 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 Corporation Counsel of the **City** 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, is entitled 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 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 to 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 officers, 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 44 and 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, or those for amounts deducted by the **Commissioner** from the final requisition or by the **Comptroller** 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 officer, 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 from commencing an action for breach of **Contract** under this provision to the extent permitted by **Law** and by the terms of the **Contract** 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 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 intended for 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 the 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; or if

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.

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 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 a lawsuit 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** shall be 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 provision 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 of reducing 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 complete 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 previous provisions of this Chapter X shall be in addition to any and all other legal or equitable remedies permissible in the premises.

54.3 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**.

54.4 The expense of such completion, 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 forth in 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**.

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 perform the **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 lawsuit, 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 lawsuit be instituted or maintained on any such claims unless such lawsuit is commenced within six (6) months after the date the **Commissioner** issues a Certificate of **Substantial Completion** pursuant to Article 44; except that:

56.2.1 Any claims arising out of events occurring after the date the **Commissioner** issues a Certificate of **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 Any claims for monies deducted, retained or withheld under the provisions of this **Contract** shall be asserted within six (6) months after the date when such monies becomes 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 lawsuit 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 indemnify the **City** against any and all claims and judgments for damages for any infringement of copyright and patents or use of patented articles, tools, materials, equipment, appliances or processes in the performance or completion of the **Work**, including all costs and expenses which the **City** shall or may incur or be obligated to pay by reason thereof.

ARTICLE 58. NO CLAIM AGAINST OFFICERS, AGENTS OR EMPLOYEES

58.1 No claim whatsoever shall be made by the **Contractor** against any officer, agent or employee of the **City** for, or on account of, anything done or omitted to be done in connection with this **Contract**.

ARTICLE 59. SERVICES OF NOTICES

59.1 The **Contractor** hereby designates the business address specified 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. Actual delivery of any such notice, direction or communication to the aforesaid place, or depositing it in a postpaid wrapper addressed thereto in any post office box (P.O. Box) regularly maintained by the United States Postal Service, shall be conclusively deemed to be sufficient service thereof upon the **Contractor** as the date of such delivery or deposit.

59.2 Such address 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, local taxes and Sales and Compensation Use Taxes of the State of New York and of cities and counties on all materials and supplies 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** or a **Subcontractor**, or to supplies and materials which even though they are consumed, are not incorporated into the completed **Work** (consumable supplies), and the **Contractor** and its **Subcontractors** shall be responsible for and pay any and all applicable taxes, including Sales and Compensation Use Taxes, on such leased tools, machinery, equipment or other property and upon all such unincorporated supplies and materials.

62.2 The **Contractor** agrees to sell and the **City** agrees to purchase all supplies and materials, other than consumable supplies, 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 supplies and materials shall be in full payment and consideration for the sale of such supplies and materials herein.

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 for the performance of such **Work**, labor and services, and the sum so paid pursuant to this **Contract** for such **Work**, labor, etc., 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** and labor.

62.3 The purchase by the **Contractor** of the supplies and materials sold hereunder shall be a purchase or procurement for resale and therefore not subject to the New York State or **City** Sales or Compensation Use Taxes or any such taxes of cities or counties. The sale of such supplies and materials by the **Contractor** to the **City** is exempt from the aforesaid sales or compensating use taxes. With respect to such supplies and materials, 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 supplies and materials, free of liens and/or encumbrances, and the **Contractor** shall mark or otherwise identify all such materials as the property of the **City**.

62.4 Title to all materials 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 supplies and materials to the **Site** and prior to its becoming a part of the permanent structure and/or construction. Notwithstanding such transfer of title, the **Contractor** shall have the full and continuing responsibility to install such materials and supplies in accordance with the provisions of this **Contract**, protect them, maintain them in a proper condition and forthwith repair, replace and make good any damage thereto, theft or disappearance thereof, and furnish additional materials 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 such supplies and materials are rejected as being defective or otherwise unsatisfactory, title to all such supplies and materials shall be deemed to have been transferred back to the **Contractor**.

62.5 The purchase by **Subcontractors** of supplies and materials to be sold hereunder shall also be a purchase or procurement for resale to the **Contractor** (either directly or through other **Subcontractors**) and therefore not subject to the aforesaid Sales or Compensation Use Taxes, provided that the subcontract agreements provide for the resale of such supplies and materials prior to and separate and apart from the incorporation of such supplies and materials into the permanent structure and/or construction and that such subcontract agreements are in a form similar to this **Contract** with respect to the separation of the sale of materials from the **Work** and labor, services, consumable supplies and any other matters to be provided, and provided further that the subcontract agreements provide separate prices for materials and all other services and matters. Such separation shall actually be followed in practice, including the separation of payments for supplies and materials from the payments for other **Work** and labor and other things to be provided.

62.6 The **Contractor** and its **Subcontractors** and Materialmen shall obtain any and all necessary **Contractor Exempt Purchase Certificates** or **Resale Certificates** from the appropriate governmental **Agency** or

Agencies, and furnish a **Contractor Exempt Purchase Certificate** or **Resale Certificate** to all persons, firms or corporations from which they purchase supplies and materials for the performance of the **Work** covered by this **Contract**.

62.7 In the event any of the provisions of this article shall be deemed to be in conflict with any other provisions of this **Contract** or create any ambiguity, then the provisions of this article 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 New York 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 interest in, 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 **Agreement**, 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 in assessing 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 to the 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 the person 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 that has 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 herein 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 herein 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 herein 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 herein 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 **Contract**.

64.2 In the event of termination by the **City** pursuant to this article, 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 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 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, less salvage value, 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:

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, whichever is less, 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 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 to the 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 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.

64.2.2 Unit Price Contracts or Items: On all unit price **Contracts**, or on unit price items in a **Contract**, the City will pay the **Contractor** the sum of 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 will be made pursuant to Article 64.2.1(b).

64.2.3 Time and Material Contracts or Items: On all **Contracts** or items in a **Contract** where time and material records are specified as the basis for payment of the **Work**, 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 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 Cost shall not include overhead.

64.3 In no event shall any payments under this article exceed the **Contract** price for such items.

64.4 All payments pursuant to this article 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, 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 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** of New York, State of New York, 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 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 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 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 United States 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 State of New York, upon request of the **City**, the **Contractor** shall either consent to a transfer of the action to a State Court of competent jurisdiction located in the **City** and State 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 State Court of competent jurisdiction in the City.

65.3 If any provision(s) of this article 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 of the Export Administration Act of 1979, as amended, or the regulations of the United States Department of Commerce 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, 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.

67.2 Unless specifically waived by the **Commissioner** with the approval of the Division of Economic and Financial Opportunity of the 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 enterprise ("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 prime **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 if the **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 LBE's 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 **Contract**. Remedy for such breach of **Contract** may include the imposition of any or all of the following sanctions:

67.6.1 Reducing a **Contractor's** compensation by an amount equal to the dollar value of the percentage of the LBE subcontracting requirement not complied with;

67.6.2 Declaring the **Contractor** in default;

67.6.3 Where non-compliance is by an LBE, de-certifying and declaring the LBE ineligible to 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 and rules, 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 to and 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 assess, 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 action efforts 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 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 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. HEALTH INSURANCE COVERAGE

70.1 If the price for which this Contract was awarded exceeds \$100,000, or if the price for which this Contract was awarded when combined with other construction or services contracts awarded the Contractor by the City in the year prior to award of this Contract exceeds \$100,000, the Contractor, following registration of the Contract, shall be required to submit responses to requests for information regarding the nature of any health insurance provided by the Contractor to its employees and their spouses and domestic partners, upon request of the Agency or other designated City agency.

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 strict accordance with the Specifications and Addenda thereto, numbered One.

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 of: Eight million Dollars, (\$ 8,113,500.00), 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.
One hundred thirteen thousand five hundred dollars.

ARTICLE 76. ELECTRONIC FUNDS TRANSFER

76.1 In accordance with Section 6-107.1 of the New York City Administrative Code, the Contractor agrees to accept payments under this Agreement from the City by electronic funds transfer. An electronic funds transfer 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 Agreement, 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 Finance with information necessary for Contractor to receive electronic funds transfer payments through the 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 agreement. 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 agency head may waive the application of the requirements herein to payments on contracts entered into pursuant to §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 contracting agency may waive the requirements hereunder 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 – PARTICIPATION BY MINORITY-OWNED AND WOMEN-OWNED BUSINESS
ENTERPRISES IN CITY PROCUREMENT**

NOTICE TO ALL PROSPECTIVE CONTRACTORS

ARTICLE I. M/WBE PROGRAM

Local Law No. 129 of 2005 added Section 6-129 to the Administrative Code of the City of New York. The local law creates a program for participation by minority-owned and women-owned business enterprises (MBEs and WBEs) in City procurement. As stated in the 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 made pursuant to Local Law 129, and the rules of the Department of Small Business Services ("DSBS") promulgated thereunder.

If this Contract is subject to the Minority-Owned and Women-Owned Business Enterprise ("M/WBE") program created by Local Law 129, the specific requirements of M/WBE participation for this Contract are set forth in Schedule B of the Contract (entitled the "Subcontractor Utilization Plan"), and are detailed below. The Contractor must comply with all applicable M/WBE requirements for this Contract. Schedule B of the Contract ("Subcontractor Utilization Plan") is included in the Bid Booklet.

Article I, Part A, below, sets forth provisions related to the participation goals for construction 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
AND PROFESSIONAL SERVICES CONTRACTS**

1. The Target Subcontracting Percentage applicable to this Contract is set forth on Schedule B, Part I to this Contract (see Page 1, line (1)). The "Target Subcontracting Percentage" is the percentage of the total Contract which Agency anticipates that the prime contractor for this Contract would in the normal course of business award to one or more subcontractors for amounts under \$1 million for construction and professional services.

A prospective contractor may seek a full or partial pre-award waiver of the Target Subcontracting Percentage in accordance with Local Law 129 and Part A, Section 10 below. To apply for the a full or partial waiver of the Target Subcontracting Percentage, a prospective contractor must complete Part III (Page 4) of Schedule B, and must submit such request no later than seven (7) days prior to the date and time the bids or proposals are due, in writing to the Agency by e-mail at poped@ddc.nyc.gov or via facsimile at (718) 391-1885. Bidders/proposers who have submitted requests will receive a response by no later than two (2) calendar days prior to the date bids or proposals are due, provided, however, that if that date would fall on a weekend or holiday, a response will be provided by close-of-business on the business day before such weekend or holiday date.

2. The Subcontractor Participation Goals established for this Contract are set forth on Schedule B, Part I to this Contract (see Page 1, line (2) and/or line (3)). The Subcontractor Participation Goals represent a percentage of the total dollar value of all construction and/or professional services subcontracts under this Agreement for amounts under \$1 million.

3. If Subcontractor Participation Goals have been established for this Contract, Contractor agrees or shall agree as a material term of the Agreement that, with respect to the total amount of the Agreement to be awarded to one or more subcontractors pursuant to subcontracts for amounts under \$1 million, Contractor shall be subject to the Subcontractor Participation Goals, unless the goals are modified by Agency in accordance with Local Law 129 and Part A, Section 11 below.

4. If Subcontractor 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, Part II Subcontractor Utilization Plan (see Page 2-3) indicating: (a) the percentage of work it intends to subcontract; (b) the percentage of work it intends to

award to subcontractors for amounts under \$1 million; (c) in cases where the prospective contractor intends to award subcontracts for amounts under \$1 million, a description of the type and dollar value of work designated for participation by MBEs and/or WBEs; and (d) the general time frames in which such work by MBEs and/or WBEs is scheduled to occur. In the event that this Subcontractor Utilization Plan indicates that the bidder or proposer, as applicable, does not intend to award the **Target Subcontracting Percentage**, 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 **Target Subcontracting Percentage** in accordance with Local Law 129 and Part A, Section 10 below.

THE BIDDER/PROPOSER MUST COMPLETE THE SUBCONTRACTOR UTILIZATION PLAN INCLUDED HEREIN (SCHEDULE B, PART II). SUBCONTRACTOR UTILIZATION PLANS WHICH DO NOT INCLUDE THE REQUIRED AFFIRMATIONS WILL BE DEEMED TO BE NON-RESPONSIVE, UNLESS A FULL WAIVER OF THE TARGET SUBCONTRACTING PERCENTAGE IS GRANTED (SCHEDULE B PART III). IN THE EVENT THAT THE CITY DETERMINES THAT VENDOR HAS SUBMITTED A SUBCONTRACTOR UTILIZATION PLAN WHERE THE REQUIRED AFFIRMATIONS ARE COMPLETED BUT OTHER ASPECTS OF THE PLAN ARE NOT COMPLETE, OR CONTAIN A COPY OR COMPUTATION ERROR THAT IS AT ODDS WITH THE AFFIRMATION, THE VENDOR 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 PLAN 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 EMAILED OR FAXED (IF THE VENDOR HAS PROVIDED AN EMAIL ADDRESS OR FAX NUMBER), OR NO LATER THAN FIVE (5) DAYS FROM THE DATE OF MAILING OR UPON DELIVERY, IF DELIVERED.

5. Where a Subcontractor 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. **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 Subcontractor Participation Goals established for this Contract by proposing one or more subcontractors that are M/WBEs for any portion of the Wicks trade work if the amount to be awarded to such M/WBE subcontractor is under \$1 million. 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. M/WBE firms must be certified by DSBS in order for the Contractor to credit such firms' participation toward the attainment of the M/WBE participation goals. Such certification must occur prior to the firms' commencement of work as subcontractors. A list of M/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) 513-6356, or by visiting or writing DSBS at 110 William St., New York, New York, 10038, 7th 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.

7. Where a Subcontractor 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 paid to subcontractors (including subcontractors that are not MBEs or WBEs); the names, addresses and contact numbers of each MBE or WBE hired as a subcontractor pursuant to such plan as well as 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 paid to subcontractors (including subcontractors that are not MBEs or WBEs); 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 hired pursuant to such plan, 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 Subcontractor Utilization Plan, Agency shall take appropriate action, in accordance with Local Law 129 and Article II below, unless the Contractor has obtained a modification of its Subcontractor Utilization Plan in accordance with Local Law 129 and Part A, Section 11 below.

9. Where a Subcontractor Utilization Plan has been submitted, and the Contractor requests a change order the value of which exceeds 10 percent of the Agreement, Agency shall establish participation goals for the work to be performed pursuant to the change order.

10. Pre-award waiver of **Target Subcontracting Percentage**. Agency may grant a full or partial waiver of the **Target Subcontracting Percentage** to a bidder or proposer, as applicable, who demonstrates—before submission of the bid or proposal—that it has legitimate business reasons for proposing the level of subcontracting in its Subcontractor Utilization Plan. In making its determination, Agency shall consider factors that shall include, but not be limited to, whether the bidder or proposer, 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 for under one million dollars represented by the **Target Subcontracting Percentage**. In making such determination, Agency may consider whether the Subcontractor Utilization Plan is consistent with past subcontracting practices of the bidder or proposer, as applicable, and whether the bidder or proposer, as applicable, has made good faith efforts to identify portions of the Contract that it intends to subcontract.

11. Modification of Subcontractor Utilization Plan. A Contractor may request a modification of its Subcontractor Utilization Plan (**Subcontractor Participation Goals**) 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 Subcontractor Utilization Plan as part of its bid submission.** The Agency may grant a request for Modification of a Contractor's Subcontractor 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 **Subcontractor Participation Goals**. In making such determination, Agency shall consider evidence of the following efforts, as applicable, along with any other relevant factors:

- (a) 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;
- (b) The Contractor provided notice of specific opportunities to participate in the Contract, in a timely manner, to minority and women's business organizations;
- (c) The Contractor sent written notices, by certified mail or facsimile, in a timely manner, to advise MBEs and WBEs that their interest in the Contract was solicited;
- (d) 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 Subcontractor Utilization Plan, and for which the Contractor claims an inability to retain MBEs or WBEs;
- (e) 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;
- (f) The Contractor made efforts to negotiate with MBEs and/or WBEs as relevant to perform specific subcontracts;
- (g) Timely written requests for assistance made by the Contractor to Agency's M/WBE liaison officer and to DSBS;
- (h) 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.

12. If this Contract is for an indefinite quantity of construction or professional services or is a requirements type contract and the Contractor has submitted a Subcontractor Utilization Plan and has committed to subcontract work to MBEs and/or WBEs in order to meet the **Subcontractor Participation Goals**, the Contractor will not be deemed in violation of the M/WBE 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.

13. If **Subcontractor Participation Goals** have been established for 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 Subcontractor 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 Subcontractor Utilization Plan.
2. Pursuant to DSBS rules, construction contracts that include a requirement for a Subcontractor Utilization Plan shall not be subject to the law governing Locally Based Enterprises set forth in Administrative Code Section 6-108.1.
3. DSBS is available to assist contractors and potential contractors in determining the availability of MBEs and WBEs to participate as subcontractors, and in identifying opportunities that are appropriate for participation by MBEs and WBEs in contracts.
4. Prospective contractors are encouraged to enter into joint ventures with MBEs and WBEs.
5. By submitting a bid or proposal the Contractor hereby acknowledges its understanding of the M/WBE requirements set forth herein and the pertinent provisions of Local Law 129 of 2005, and any rules promulgated thereunder, and if awarded this Contract, the Contractor hereby agrees to comply with the M/WBE requirements of this Contract and pertinent provisions of Local Law 129 of 2005, 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 M/WBE's to meet the required **Subcontractor 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 Subcontractor Utilization Plan, Agency shall send a written notice to the Contractor describing the alleged noncompliance and offering 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 this Section 6-129, including, but not limited any Subcontractor 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) assess liquidated damages or reduction of fees, provided that liquidated damages may be based on amounts representing costs of delays in carrying out the purposes of the program established by Section 6-129, 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) exercise 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) take any other appropriate remedy.

4. If a Subcontractor Utilization Plan has been submitted, and pursuant to this Article II, Section 3, the Contractor has been found to have failed to award subcontracts to MBEs and/or WBEs sufficient to meet the Subcontractor Participation Goals contained in its Subcontractor Utilization Plan or the Subcontractor 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 subcontracts required to be awarded to MBE and/or WBE subcontractors to meet the Subcontractor Participation Goals and the dollar amount the Contractor actually awarded and paid to MBE and/or WBE subcontractors. In view of the difficulty of accurately ascertaining the loss which the City will suffer by reason of Contractor's failure to meet the Subcontractor 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 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), 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 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 Subcontractor Utilization Plan shall be a factor in the evaluation of its performance. Whenever a contracting agency determines that a contractor's compliance with a Subcontractor Utilization Plan has been unsatisfactory, the agency shall, after consultation with the city chief procurement officer, file an advice of caution form for inclusion in VENDEX as caution data.

IN WITNESS WHEREOF, the Commissioner, on behalf of the City of New York, and the Contractor, have executed this agreement in quadruplicate, two parts of which are to remain with the Commissioner, another to be filed with the Comptroller of the City, and the fourth to be delivered to the Contractor.

THE CITY OF NEW YORK

By: 
Deputy Commissioner

CONTRACTOR: S & N Builders, Inc.

By: 
(Member of Firm or Officer of Corporation)

Title: 

(Where Contractor is a Corporation, add):
Attest:

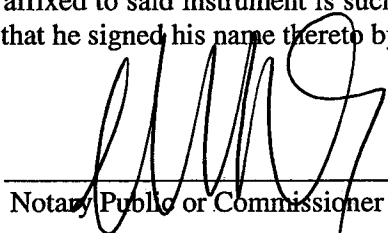

Secretary

(Seal)

ACKNOWLEDGMENT OF PRINCIPAL, IF A CORPORATION

State of NY County of QUEEN ss:

On this 9th day of Jan. 2014, before me personally came Sikander Raja
to me known, who, being by me duly sworn did depose and say that he resides at
GARDEN CITY that he is the 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.



Notary Public or Commissioner of Deeds

VICTORIA AYO-VAUGHAN
Notary Public, State of New York
Registration #01AY5014042
Qualified In Queens County
Commission Expires July 15, 2015

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

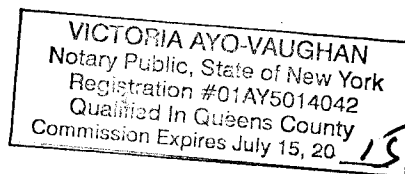
ACKNOWLEDGMENT BY COMMISSIONER

State of New York County of Queens ss:

On this 9th day of January 2014 before me personally came David Resnick
to me known, and known to be the Deputy Commissioner of the Department of Design and Construction of
The City of New York, the person described as such in and who as such executed the foregoing instrument
and he acknowledged to me that he executed the same as Deputy Commissioner for the purposes therein
mentioned.



Notary Public or Commissioner of Deeds



AUTHORITY

MAYOR'S CERTIFICATE NO. CBX
BUDGET DIRECTOR'S CERTIFICATE NO.

DATED
DATED

APPROPRIATION
COMMISSIONER'S CERTIFICATE

In conformity with the provisions of Section 6-101 of the Administrative Code of the City of New York, it is hereby certified that the estimated cost of the work, materials and supplies required by the within Contract, amounting to

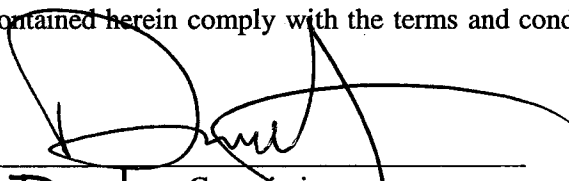
Eight million one hundred thirteen
thousand five hundred dollars

Dollars (\$ 8,113,500.00)

is chargeable to the fund of the Department of Design and Construction entitled Code

Department of Design and Construction

I hereby certify that the specifications contained herein comply with the terms and conditions of the BUDGET.



Deputy Commissioner

COMPTROLLER'S CERTIFICATE

The City of New York _____

Pursuant to the provisions of Section 6-101 of the Administrative Code of the City of New York, I hereby certify that there remains unapplied and unexpended a balance of the above mentioned fund applicable to this Contract sufficient to pay the estimated expense of executing the same viz:

\$ _____

Comptroller

**MAYOR'S CERTIFICATE OR
CERTIFICATE OF THE DIRECTOR
OF THE BUDGET**

Performance Bond #1 (Pages 80 to 83): Use if the total contract price is \$5 Million Or Less. Performance Bond #1 has been approved by the U.S. Small Business Administration ("SBA") for participation in its Bond Guarantee Program.

PERFORMANCE BOND #1 (Page 1)

PERFORMANCE BOND #1

KNOW ALL PERSONS BY THESE PRESENTS, That we, _____

hereinafter referred to as the "Principal", and _____

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

(\$ _____) 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

a copy of which Contract is annexed to and hereby made a part of this bond as though herein set forth in full;

Performance Bond #2 (Pages 82 to 85): Use if the total contract price is more than \$5 Million.

PERFORMANCE BOND #2 (Page 1)

PERFORMANCE BOND #2

Bond #KO 89 06 22 1

KNOW ALL PERSONS BY THESE PRESENTS,;

That we, S&N Builders, Inc.

156 East 3rd Street

Mount Vernon, NY 10550

hereinafter referred to as the "Principal,"

and, Westchester Fire Insurance Company

10 Exchange Place

Jersey City, NJ 07302

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 Eight Million One Hundred Thirteen Thousand Five Hundred and 00/100

(\$ 8,113,500.00) 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.

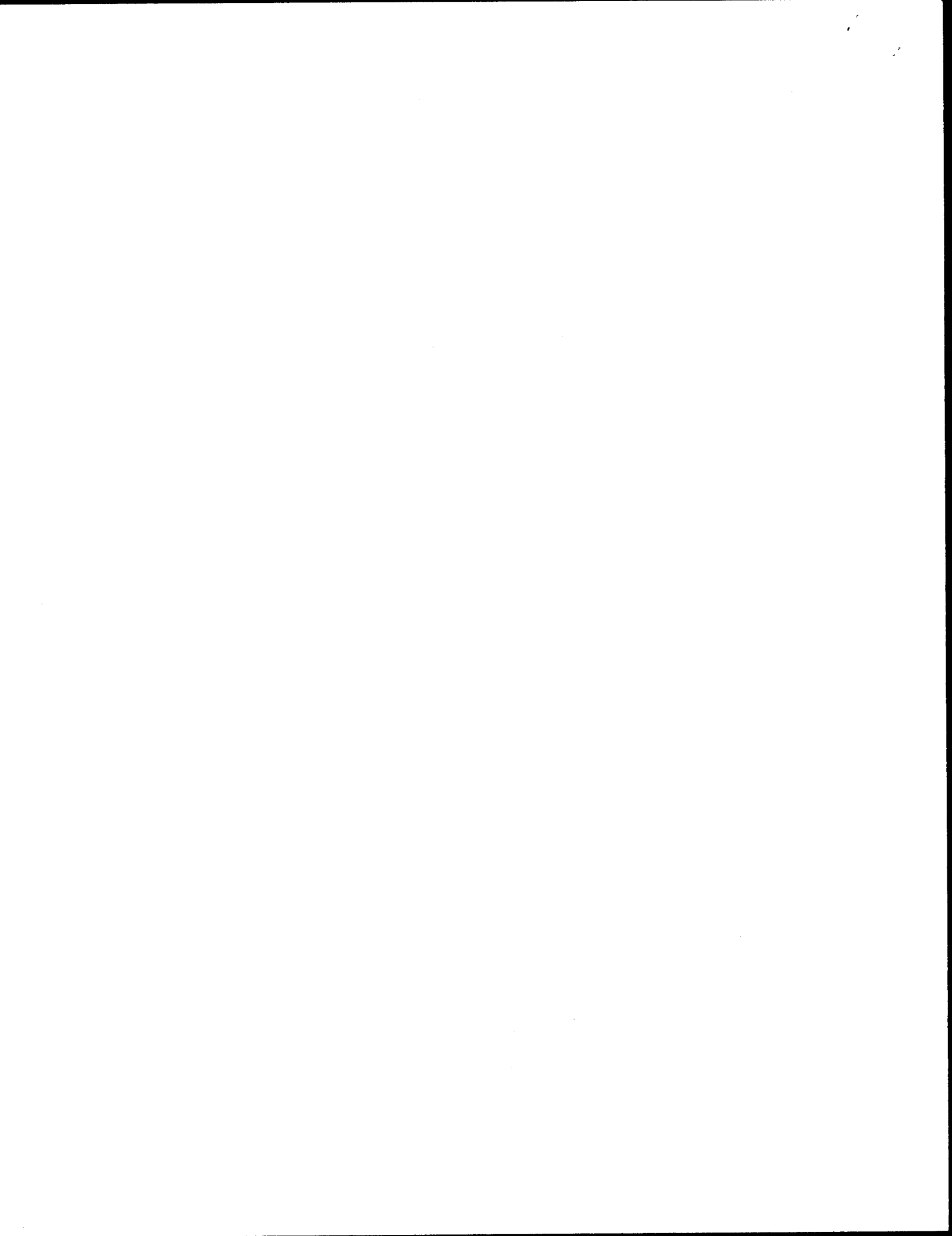
WHEREAS, the Principal is about to enter, or has entered, into a Contract in writing with the City for

FMS ID: PV467BRAC-R - E-PIN: 85013B0075001 - DDC PIN: 8502013PV0012C -

Bronx River Art Center - Renovation - Boro of the Bronx

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, 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 City from 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



Performance Bond #2 (Pages 82 to 85): Use if the total contract price is more than \$5 Million.

PERFORMANCE BOND #2 (Page 2)

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 or which the said City of New York may be called upon to pay any person or corporation by reason of any damages arising or growing out of the Principal's default of the Contract, then this obligation shall be null and void, otherwise to remain in full force and effect.

The Surety (Sureties), for value received, hereby stipulates and agrees, upon written notice from the City that 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 the Contract, 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 thereof from 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 by any 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.

Performance Bond #2 (Pages 82 to 85): Use if the total contract price is more than \$5 Million.

PERFORMANCE BOND #2 (Page 3)

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

____ 30th _____ day of _____ December _____ 20 _____ 13 _____
(Seal)

____ S&N Builders, Inc. _____ (L.S.)

Principal

By: _____
(Seal)

Surety

By: _____
(Seal) _____ Westchester Fire Insurance Company _____

Surety

By: _____
(Seal) _____ Susan P. Hammel, Attorney-In-Fact _____

Surety

By: _____
(Seal) _____

Surety

By: _____
(Seal) _____

Surety

By: _____

Bond Premium Rate _____

Bond Premium Cost _____

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 a duly authorized officer, agent, or attorney-in-fact.

There should be executed an appropriate number of counterparts of the bond corresponding to the number of counterparts of the Contract.

Performance Bond #2 (Pages 82 to 85): Use if the total contract price is more than \$5 Million.

PERFORMANCE BOND #2 (Page 4)

ACKNOWLEDGMENT OF PRINCIPAL IF A CORPORATION

State of New York County of Westchester ss:

On this 7 day of January, 2014 before me personally
came Sakander Raja,

to me known, who, being by me duly sworn did depose and say that he resides
at Garden City

New York; that he/she is the President

of the corporation described in and which executed the foregoing instrument; that he/she signed his/her name to the
foregoing instrument by order of the directors of said corporation as the duly authorized and binding act thereof.

Punniyakumar

PUNNIYAKUMARI MUTHUVEL

NOTARY PUBLIC-STATE OF ~~NEW YORK~~ or Commissioner of Deeds.

No. 01MU6283472

Qualified in Queens County

My Commission Expires June 03, 2017

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 resides
at _____

_____ ; 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 resides
at _____

_____, 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.

ACKNOWLEDGEMENT OF PRINCIPAL, OF A CORPORATION

STATE OF New York

COUNTY OF Westchester

SS:

On this 7 day of January, 2014 before me personally came Sakander Raja to me known, who, being by me duly sworn did depose and say that he resides at Garden City, NY that he is the President of S & N Builders, Inc. 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 the foregoing instrument is such seal; that it was an affixed by order of the board of directors of said corporation; and that he signed his name thereto by like order.

Punniyakumari Muthuvel

PUNNIYAKUMARI MUTHUVEL
NOTARY PUBLIC-STATE OF NEW YORK
No. 01MU6283472
Qualified in Queens County
My Commission Expires June 03, 2017

Notary Public

ACKNOWLEDGEMENT OF SURETY

STATE OF New York

COUNTY OF Nassau

SS:

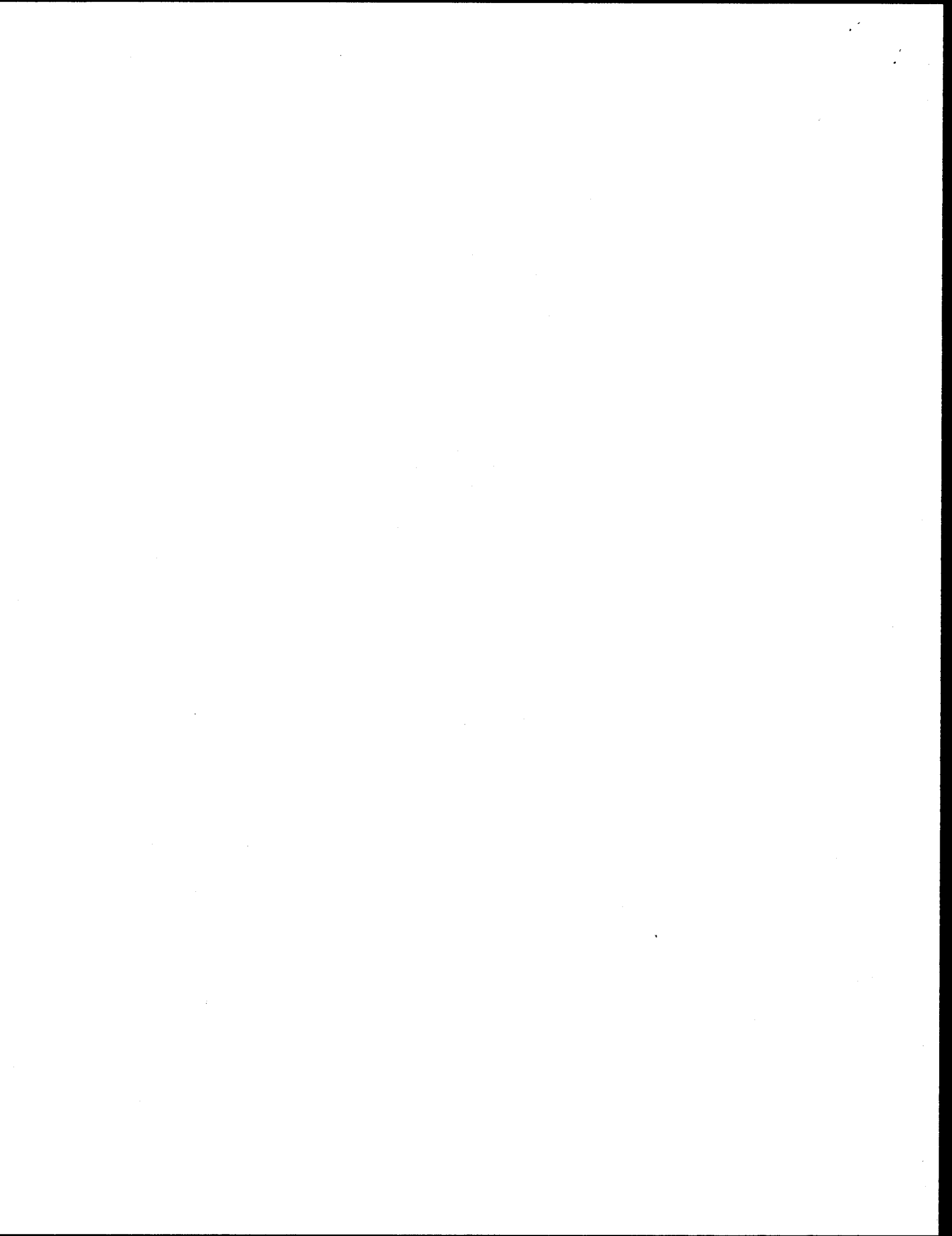
On this 30th day of December, 2013, before me personally came Susan P. Hammel to me known, who, being by me duly sworn, did depose and say that he is an Attorney-In-Fact of Westchester Fire Insurance Company the corporation described in and which executed the within instrument; that he knows the corporate seal of said corporation; that the seal affixed to the within instrument is such corporate seal, and that he signed and said instrument and affixed the said seal as Attorney-In-Fact by authority of the Board of Directors of said corporation and by authority of this office under the Standing Resolutions thereof.

LYNN ANN INFANTI
Notary Public, State of New York
No. 011N6004351
Qualified in Suffolk County 2014
Commission Expires March 23, 2014

My commission expires _____

[Signature]

Notary Public



Power of Attorney

WESTCHESTER FIRE INSURANCE COMPANY

Know all men by these presents: That **WESTCHESTER FIRE INSURANCE COMPANY**, a corporation of the Commonwealth of Pennsylvania pursuant to the following Resolution, adopted by the Board of Directors of the said Company on December 11, 2006, to wit:

"RESOLVED, that the following authorizations relate to the execution, for and on behalf of the Company, of bonds, undertakings, recognizances, contracts and other written commitments of the Company entered into the ordinary course of business (each a "Written Commitment"):

- (1) Each of the Chairman, the President and the Vice Presidents of the Company is hereby authorized to execute any Written Commitment for and on behalf of the Company, under the seal of the Company or otherwise.
- (2) Each duly appointed attorney-in-fact of the Company is hereby authorized to execute any Written Commitment for and on behalf of the Company, under the seal of the Company or otherwise, to the extent that such action is authorized by the grant of powers provided for in such persons written appointment as such attorney-in-fact.
- (3) Each of the Chairman, the President and the Vice Presidents of the Company is hereby authorized, for and on behalf of the Company, to appoint in writing any person the attorney-in-fact of the Company with full power and authority to execute, for and on behalf of the Company, under the seal of the Company or otherwise, such Written Commitments of the Company as may be specified in such written appointment, which specification may be by general type or class of Written Commitments or by specification of one or more particular Written Commitments.
- (4) Each of the Chairman, the President and Vice Presidents of the Company is hereby authorized, for and on behalf of the Company, to delegate in writing any other officer of the Company the authority to execute, for and on behalf of the Company, under the Company's seal or otherwise, such Written Commitments of the Company as are specified in such written delegation, which specification may be by general type or class of Written Commitments or by specification of one or more particular Written Commitments.
- (5) The signature of any officer or other person executing any Written Commitment or appointment or delegation pursuant to this Resolution, and the seal of the Company, may be affixed by facsimile on such Written Commitment or written appointment or delegation.


FURTHER RESOLVED, that the foregoing Resolution shall not be deemed to be an exclusive statement of the powers and authority of officers, employees and other persons to act for and on behalf of the Company, and such Resolution shall not limit or otherwise affect the exercise of any such power or authority otherwise validly granted or vested.

Does hereby nominate, constitute and appoint Joseph Sforzo, Robert M Kempner, Robert W O'Kane, Susan P Hammel, all of the City of PLAINVIEW, New York, each individually if there be more than one named, its true and lawful attorney-in-fact, to make, execute, seal and deliver on its behalf, and as its act and deed any and all bonds, undertakings, recognizances, contracts and other writings in the nature thereof in penalties not exceeding Five million dollars & zero cents (\$5,000,000.00) and the execution of such writings in pursuance of these presents shall be as binding upon said Company, as fully and amply as if they had been duly executed and acknowledged by the regularly elected officers of the Company at its principal office.

IN WITNESS WHEREOF, the said Stephen M. Haney, Vice-President, has hereunto subscribed his name and affixed the Corporate seal of the said **WESTCHESTER FIRE INSURANCE COMPANY** this 16 day of October 2012.

WESTCHESTER FIRE INSURANCE COMPANY

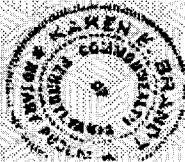



Stephen M. Haney, Vice President

COMMONWEALTH OF PENNSYLVANIA
COUNTY OF PHILADELPHIA ss.

On this 16 day of October, AD. 2012 before me, a Notary Public of the Commonwealth of Pennsylvania in and for the County of Philadelphia came Stephen M. Haney, Vice-President of the **WESTCHESTER FIRE INSURANCE COMPANY** to me personally known to be the individual and officer who executed the preceding instrument, and he acknowledged that he executed the same, and that the seal affixed to the preceding instrument is the corporate seal of said Company; that the said corporate seal and his signature were duly affixed by the authority and direction of the said corporation; and that Resolution, adopted by the Board of Directors of said Company, referred to in the preceding instrument, is now in force.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my official seal at the City of Philadelphia the day and year first above written.




Notary Public

I, the undersigned Assistant Secretary of the **WESTCHESTER FIRE INSURANCE COMPANY**, do hereby certify that the original POWER OF ATTORNEY, of which the foregoing is a substantially true and correct copy, is in full force and effect.

In witness whereof, I have hereunto subscribed my name as Assistant Secretary, and affixed the corporate seal of the Corporation, this 30th day of December 2013




William L. Kelly, Assistant Secretary

THIS POWER OF ATTORNEY MAY NOT BE USED TO EXECUTE ANY BOND WITH AN INCEPTION DATE AFTER October 16, 2014.

007161043

*Please refer to the label for additional security
features before handling this document. IF NOT
PRESENT, DO NOT ASSOCIATE THE DOCUMENT.

*Note that on the back of document should be
a higher level of security. If not authentic -
do not use the document.

*Authenticating - in this configuration, the code
is used to the form of the document should
be: "Document-Project: Standardized
Security"

*If the document is not Standardized, the mark
is used to the form of the document should
be: "Document-Project: Standardized
Security"

*An official document is present and is
a copy of an original.

*Security will pass in an event if copied.

WESTCHESTER FIRE INSURANCE COMPANY - NAIC# 10030

FINANCIAL STATEMENT

DECEMBER 31, 2012

ADMITTED ASSETS

BONDS	\$1,915,932,115
SHORT - TERM INVESTMENTS	22,465,390
STOCKS	0
REAL ESTATE	0
CASH ON HAND AND IN BANK	(41,292,474)
PREMIUM IN COURSE OF COLLECTION*	56,678,650
INTEREST ACCRUED	17,136,830
OTHER ASSETS	148,350,304
TOTAL ASSETS	<u>\$2,119,270,815</u>

LIABILITIES

RESERVE FOR UNEARNED PREMIUMS	\$215,324,197
RESERVE FOR LOSSES	1,103,762,744
RESERVE FOR TAXES	3,515,562
FUNDS HELD UNDER REINSURANCE TREATIES	4,484,136
OTHER LIABILITIES	(21,519,017)
TOTAL LIABILITIES	<u>1,305,567,622</u>

CAPITAL: 70,000 SHARES, \$71.43 PAR VALUE	5,000,100
CAPITAL: PAID IN	292,187,374
AGGREGATE WRITE-INS FOR SPECIAL SURPLUS FUNDS	111,710,473
SURPLUS (UNASSIGNED)	404,805,246
SURPLUS TO POLICYHOLDERS	<u>813,703,193</u>
TOTAL	<u>\$2,119,270,815</u>

(*EXCLUDES PREMIUM MORE THAN 90 DAYS DUE.)

STATE OF PENNSYLVANIA

COUNTY OF PHILADELPHIA

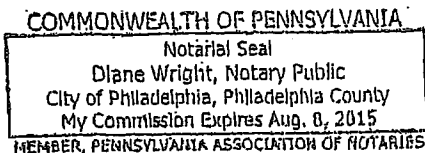
John P. Taylor, being duly sworn, says that he is Vice President of Westchester Fire Insurance Company and that to the best of his knowledge and belief the foregoing is a true and correct statement of the said Company's financial condition as of the 31 st day of December, 2012.

Sworn before me this March 15, 2013

John P. Taylor
Vice President

Diane Wright
Notary Public

August 8, 2015
My commission expires



Payment Bond (Pages 86 to 89): Use for any contract for which a Payment Bond is required.

PAYMENT BOND (Page 1)

Bond #KO 89 06 22 1

PAYMENT BOND

KNOW ALL PERSONS BY THESE PRESENTS, That we, _____

S&N Builders, Inc.

156 East 3rd Street

Mount Vernon, NY 10550

hereinafter referred to as the "Principal", and _____

Westchester Fire Insurance Company

10 Exchange Place

Jersey City, NJ 07302

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

Eight Million One Hundred Thirteen Thousand Five Hundred and 00/100

(\$8,113,500.00) 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 ID: PV467BRAC-R - E-PIN: 85013B0075001 - DDC PIN: 8502013PV0012C -

Bronx River Art Center - Renovation - Boro of the Bronx

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

Payment Bond (Pages 86 to 89): Use for any contract for which a Payment Bond is required.

PAYMENT BOND (Page 2)

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 in full 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 right of the City to require a bond containing the foregoing provisions, and they do hereby further expressly waive any 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 (Pages 86 to 89): Use for any contract for which a Payment Bond is required.

PAYMENT BOND (Page 3)

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 30th day of December, 2013.

(Seal)

S&N Builders, Inc. _____ (L.S.)
Principal

By: [Signature]

(Seal)

Westchester Fire Insurance Company
Surety

By: [Signature]
Susan P. Hammel, 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 a duly authorized officer, agent, or attorney-in-fact.

There should be executed an appropriate number of counterparts of the bond corresponding to the number of counterparts of the Contract.

Payment Bond (Pages 86 to 89): Use for any contract for which a Payment Bond is required.

PAYMENT BOND (Page 4)

ACKNOWLEDGMENT OF PRINCIPAL, IF A CORPORATION

State of New York County of Westchester ss:

On this 7 day of January 2014, before me personally came Sakander Raja to me known, who, being by me duly sworn did depose and say that he resides at Garden City New York that he is the 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.

Punniyakumari Muthuvel
Notary Public or Commissioner of Deeds

PUNNIYAKUMARI MUTHUVEL
NOTARY PUBLIC-STATE OF NEW YORK
No. 01MU6283472
Qualified in Queens County
My Commission Expires June 03, 2017

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 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.

ACKNOWLEDGEMENT OF PRINCIPAL, OF A CORPORATION

STATE OF N Y

COUNTY OF Westchester

SS:

On this 7th day of Jan, before me personally came Sakander Rain to me known, who, being by me duly sworn did depose and say that he resides at Garden City that he is the President of SEN BUILDERS INC 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 the foregoing instrument is such seal; that it was an affixed by order of the board of directors of said corporation; and that he signed his name thereto by like order.

Punniyakumari

Notary Public

PUNNIYAKUMARI MUTHUVEL
NOTARY PUBLIC-STATE OF NEW YORK
No. 01MU6283472
Qualified in Queens County
My Commission Expires June 03, 2017

ACKNOWLEDGEMENT OF SURETY

STATE OF New York

COUNTY OF Nassau

SS:

On this 30th day of December, 2013, before me personally came Susan P. Hammel to me known, who, being by me duly sworn, did depose and say that he is an Attorney-In-Fact of Westchester Fire Insurance Company the corporation described in and which executed the within instrument; that he knows the corporate seal of said corporation; that the seal affixed to the within instrument is such corporate seal, and that he signed and said instrument and affixed the said seal as Attorney-In-Fact by authority of the Board of Directors of said corporation and by authority of this office under the Standing Resolutions thereof.

LYNN ANN INFANTI
Notary Public, State of New York
No. 011N6004351
Qualified in Suffolk County
Commission Expires March 23, 2014

My commission expires _____

L

Notary Public

Power of Attorney

WESTCHESTER FIRE INSURANCE COMPANY

Know all men by these presents: That WESTCHESTER FIRE INSURANCE COMPANY, a corporation of the Commonwealth of Pennsylvania pursuant to the following Resolution, adopted by the Board of Directors of the said Company on December 11, 2006, to wit:

"RESOLVED, that the following authorizations relate to the execution, for and on behalf of the Company, of bonds, undertakings, recognizances, contracts and other written commitments of the Company entered into the ordinary course of business (each a "Written Commitment"):

- (1) Each of the Chairman, the President and the Vice Presidents of the Company is hereby authorized to execute any Written Commitment for and on behalf of the Company, under the seal of the Company or otherwise.
- (2) Each duly appointed attorney-in-fact of the Company is hereby authorized to execute any Written Commitment for and on behalf of the Company, under the seal of the Company or otherwise, to the extent that such action is authorized by the grant of powers provided for in such persons written appointment as such attorney-in-fact.
- (3) Each of the Chairman, the President and the Vice Presidents of the Company is hereby authorized, for and on behalf of the Company, to appoint in writing any person the attorney-in-fact of the Company with full power and authority to execute, for and on behalf of the Company, under the seal of the Company or otherwise, such Written Commitments of the Company as may be specified in such written appointment, which specification may be by general type or class of Written Commitments or by specification of one or more particular Written Commitments.
- (4) Each of the Chairman, the President and Vice Presidents of the Company is hereby authorized, for and on behalf of the Company, to delegate in writing any other officer of the Company the authority to execute, for and on behalf of the Company, under the Company's seal or otherwise, such Written Commitments of the Company as are specified in such written delegation, which specification may be by general type or class of Written Commitments or by specification of one or more particular Written Commitments.
- (5) The signature of any officer or other person executing any Written Commitment or appointment or delegation pursuant to this Resolution, and the seal of the Company, may be affixed by facsimile on such Written Commitment or written appointment or delegation.

FURTHER RESOLVED, that the foregoing Resolution shall not be deemed to be an exclusive statement of the powers and authority of officers, employees and other persons to act for and on behalf of the Company, and such Resolution shall not limit or otherwise affect the exercise of any such power or authority otherwise validly granted or vested.

Does hereby nominate, constitute and appoint Joseph Sforzo, Robert M Kempner, Robert W O'Kane, Susan P Hammel, all of the City of PLAINVIEW, New York, each individually if there be more than one named, its true and lawful attorney-in-fact, to make, execute, seal and deliver on its behalf, and as its act and deed any and all bonds, undertakings, recognizances, contracts and other writings in the nature thereof in penalties not exceeding Five million dollars & zero cents (\$5,000,000.00) and the execution of such writings in pursuance of these presents shall be as binding upon said Company, as fully and amply as if they had been duly executed and acknowledged by the regularly elected officers of the Company at its principal office,

IN WITNESS WHEREOF, the said Stephen M. Haney, Vice-President, has hereunto subscribed his name and affixed the Corporate seal of the said WESTCHESTER FIRE INSURANCE COMPANY this 16 day of October 2012.

WESTCHESTER FIRE INSURANCE COMPANY



Stephen M. Haney
Stephen M. Haney, Vice President

COMMONWEALTH OF PENNSYLVANIA
COUNTY OF PHILADELPHIA ss.

On this 16 day of October, AD. 2012 before me, a Notary Public of the Commonwealth of Pennsylvania in and for the County of Philadelphia came Stephen M. Haney, Vice-President of the WESTCHESTER FIRE INSURANCE COMPANY to me personally known to be the individual and officer who executed the preceding instrument, and he acknowledged that he executed the same, and that the seal affixed to the preceding instrument is the corporate seal of said Company; that the said corporate seal and his signature were duly affixed by the authority and direction of the said corporation, and that Resolution, adopted by the Board of Directors of said Company, referred to in the preceding instrument, is now in force.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my official seal at the City of Philadelphia the day and year first above written.



Karen E. Branstetter
Notary Public

I, the undersigned Assistant Secretary of the WESTCHESTER FIRE INSURANCE COMPANY, do hereby certify that the original POWER OF ATTORNEY, of which the foregoing is a substantially true and correct copy, is in full force and effect.

In witness whereof, I have hereunto subscribed my name as Assistant Secretary, and affixed the corporate seal of the Corporation, this 30th day of December 2013



William L. Kelly
William L. Kelly, Assistant Secretary

THIS POWER OF ATTORNEY MAY NOT BE USED TO EXECUTE ANY BOND WITH AN INCEPTION DATE AFTER October 16, 2014.

007161044

Please look for the following additional security features before accepting this document. If NOT PRESENT, DO NOT NEGOTIATE THE DOCUMENT.

- Fold lines on the back of document should be in alignment if the document is not authentic - reason for cut and paste
- Microprinting - under magnification, the issue number on the front of this document should read: "Standard Register Standardized Security".
- Thermochromic ink - Standard Register mark on back of document is thermochromic blue to clear when heat is applied.
- An Artificial Watermark is present and is viewable at an angle.
- Security void pattern on front if copied.

WESTCHESTER FIRE INSURANCE COMPANY - NAIC# 10030

FINANCIAL STATEMENT

DECEMBER 31, 2012

ADMITTED ASSETS

BONDS	\$1,915,932,115
SHORT - TERM INVESTMENTS	22,465,390
STOCKS	0
REAL ESTATE	0
CASH ON HAND AND IN BANK	(41,292,474)
PREMIUM IN COURSE OF COLLECTION*	56,678,650
INTEREST ACCRUED	17,136,830
OTHER ASSETS	148,350,304
TOTAL ASSETS	<u>\$2,119,270,815</u>

LIABILITIES

RESERVE FOR UNEARNED PREMIUMS	\$215,324,197
RESERVE FOR LOSSES	1,103,762,744
RESERVE FOR TAXES	3,515,562
FUNDS HELD UNDER REINSURANCE TREATIES	4,484,136
OTHER LIABILITIES	(21,519,017)
TOTAL LIABILITIES	<u>1,305,567,622</u>

CAPITAL: 70,000 SHARES, \$71.43 PAR VALUE	5,000,100
CAPITAL: PAID IN	292,187,374
AGGREGATE WRITE-INS FOR SPECIAL SURPLUS FUNDS	111,710,473
SURPLUS (UNASSIGNED)	404,805,246
SURPLUS TO POLICYHOLDERS	<u>813,703,193</u>
TOTAL	<u>\$2,119,270,815</u>

(*EXCLUDES PREMIUM MORE THAN 90 DAYS DUE.)

STATE OF PENNSYLVANIA

COUNTY OF PHILADELPHIA

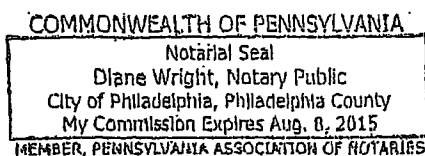
John P. Taylor, being duly sworn, says that he is Vice President of Westchester Fire Insurance Company and that to the best of his knowledge and belief the foregoing is a true and correct statement of the said Company's financial condition as of the 31 st day of December, 2012.

Sworn before me this March 15, 2013

[Signature]
Vice President

[Signature]
Notary Public

August 8, 2015
My commission expires



Performance Bond #1 (Pages 80 to 83): Use if the total contract price is \$5 Million Or Less.
Performance Bond #1 has been approved by the U.S. Small Business Administration ("SBA") for participation in its Bond Guarantee Program.

PERFORMANCE BOND #1 (Page 2)

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 City from 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 or which the said City of New York may be called upon to pay any person or corporation by reason of any damages arising or growing out of the Principal's default of the Contract, then this obligation shall be null and void, otherwise to remain in full force and effect.

The Surety (Sureties), for value received, hereby stipulates and agrees, upon written notice from the City that the City has determined that the Principal is in default of the Contract, to (1) pay the City the cost to complete the contract as determined by the City in excess of the balance of the Contract held by the City, plus any damages or costs to which the City is entitled, up to the full amount of the above penal sum, (2) fully perform and complete the Work to be performed under the Contract, pursuant to the terms, conditions, and covenants thereof, or (3) tender a completion Contractor that is acceptable to the City. The Surety (Sureties) further agrees, at its option, either to notify the City that it elects to pay the city the cost of completion plus any applicable damages and costs under option (1) above, 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 thereof from the City and, if the Surety elects to fully perform and complete the Work, then 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. If the Surety elects to tender payment pursuant to (1) above, then the Surety shall tender such amount within fifteen (15) business days notification from the City of the cost of completion. 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 pay the City the cost of completion, to commence and complete all Work as provided herein, or to tender a completion contractor.

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 by any 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 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, and waivers, and hereby expressly stipulates and agrees that any and all things done and omitted to be done by and in relation to subcontractors 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. Notwithstanding the above, if the City makes payments to the Principal before the time required by the contract that in the aggregate exceed \$100,000 or 10% of the Contract price, whichever is less, and that have not become earned prior to the Principal being found to be in default, then all payments made to the Principal before the time required by the Contract shall be added to the remaining contract value available to be paid for the completion of the Contract as if such sums had not been paid to the Principal, but shall not provide a basis for non-performance of its obligation to pay the City the cost of completion, to commence and to complete all Work as provided herein, or to tender a completion contractor.

Performance Bond #1 (Pages 80 to 83): Use if the total contract price is \$5 Million Or Less. Performance Bond #1 has been approved by the U.S. Small Business Administration ("SBA") for participation in its Bond Guarantee Program.

PERFORMANCE BOND #1 (Page 3)

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 _____ day of _____, _____.

(Seal) _____ (L.S.)
Principal

By: _____

(Seal) _____
Surety

By: _____

(Seal) _____
Surety

By: _____

(Seal) _____
Surety

By: _____

Bond Premium Rate _____

Bond Premium Cost _____

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 a duly authorized officer, agent, or attorney-in-fact.

There should be executed an appropriate number of counterparts of the bond corresponding to the number of counterparts of the Contract.

Performance Bond #1 (Pages 80 to 83): Use if the total contract price is \$5 Million Or Less. Performance Bond #1 has been approved by the U.S. Small Business Administration ("SBA") for participation in its Bond Guarantee Program.

PERFORMANCE BOND #1 (Page 4)

ACKNOWLEDGMENT OF PRINCIPAL, IF A CORPORATION

State of _____ County of _____ ss:

On this _____ day of _____, _____, before me personally came _____ to me known, who, being by me duly sworn did depose and say that he resides at _____ that he is the _____ 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.

Notary Public or Commissioner of Deeds

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 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

Performance Bond #2 (Pages 84 to 87): Use if the total contract price is more than \$5 Million.

PERFORMANCE BOND #2 (Page 1)

PERFORMANCE BOND #2

KNOW ALL PERSONS BY THESE PRESENTS, That we, _____

hereinafter referred to as the "Principal", and _____

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

(\$ _____) 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

a copy of which Contract is annexed to and hereby made a part of this bond as though herein set forth in full;

Performance Bond #2 (Pages 84 to 87): Use if the total contract price is more than \$5 Million.

PERFORMANCE BOND #2 (Page2)

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 City from 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 or which the said City of New York may be called upon to pay any person or corporation by reason of any damages arising or growing out of the Principal's default of the Contract, then this obligation shall be null and void, otherwise to remain in full force and effect.

The Surety (Sureties), for value received, hereby stipulates and agrees, upon written notice from the City that 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 the Contract, 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 thereof from 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 by any 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.

Performance Bond #2 (Pages 84 to 87): Use if the total contract price is more than \$5 Million.

PERFORMANCE BOND #2 (Page 3)

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 _____ day of _____, _____.

(Seal)

Principal (L.S.)

By: _____

(Seal)

Surety

By: _____

(Seal)

Surety

By: _____

(Seal)

Surety

By: _____

(Seal)

Surety

By: _____

(Seal)

Surety

Bond Premium Rate _____

Bond Premium Cost _____

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 a duly authorized officer, agent, or attorney-in-fact.

There should be executed an appropriate number of counterparts of the bond corresponding to the number of counterparts of the Contract.

Performance Bond #2 (Pages 84 to 87): Use if the total contract price is more than \$5 Million.

PERFORMANCE BOND #2 (Page 4)

ACKNOWLEDGMENT OF PRINCIPAL, IF A CORPORATION

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 resides at _____
_____ ; that he/she is the _____ of _____ the
corporation described in and which executed the foregoing instrument; and that he signed his name to the foregoing
instrument by order of the directors of said corporation as the duly authorized and binding act thereof.

Notary Public or Commissioner of Deeds

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 resides at _____
_____ ; 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 resides at _____
_____, 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.

Payment Bond (Pages 88 to 91): Use for any contract for which a Payment Bond is required.

PAYMENT BOND (Page 1)

PAYMENT BOND

KNOW ALL PERSONS BY THESE PRESENTS, That we, _____

hereinafter referred to as the "Principal", and _____

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

(\$ _____) 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

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

Payment Bond (Pages 88 to 91): Use for any contract for which a Payment Bond is required.

PAYMENT BOND (Page 2)

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 in full 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 right of the City to require a bond containing the foregoing provisions, and they do hereby further expressly waive any 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 placed 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 (Pages 88 to 91): Use for any contract for which a Payment Bond is required.

PAYMENT BOND (Page 3)

IN WITNESS HEREOF, 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 _____ day of _____, _____.

(Seal)

Principal (L.S.)

By: _____

(Seal)

Surety

By: _____

(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 a duly authorized officer, agent, or attorney-in-fact.

There should be executed an appropriate number of counterparts of the bond corresponding to the number of counterparts of the Contract.

Payment Bond (Pages 88 to 91): Use for any contract for which a Payment Bond is required.

PAYMENT BOND (Page 4)

ACKNOWLEDGMENT OF PRINCIPAL, IF A CORPORATION

State of _____ County of _____ ss:

On this _____ day of _____, _____ before me personally came
to me known, who, being by me duly sworn did depose and say that he resides at
_____ that he is the _____ 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.

Notary Public or Commissioner of Deeds

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 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

THIS PAGE INTENTIONALLY LEFT BLANK

**OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE**

LABOR LAW §220 PREVAILING WAGE SCHEDULE

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. Contractors are solely responsible for maintaining original payroll records which delineate, among other things, the hours each employee worked within a given classification. Contractors using rates and/or classifications not promulgated by the Comptroller do so at their own risk. Additionally, prior to bid, Agency Chief Contracting Officers must contact the Bureau of Labor Law when the need arises for a work classification not published in this schedule.

Pursuant to Labor Law §220 (3) 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 contracts. Contracting agencies anticipating doing work which requires the employment of a trade or classification not included in this schedule must request the Comptroller to establish a proper classification for the work pursuant to Labor Law §220 (3-a) (a). The prevailing rate schedule as promulgated by the Comptroller, must, in compliance with law, be annexed to and form part of the contract.

The appropriate schedule of prevailing wages and benefits must be posted at all public work sites pursuant to Labor Law §220 (3-a) (a).

This schedule is applicable for work performed during the effective period, unless otherwise noted. You will be notified of any changes to this schedule by addenda published on our web site at www.comptroller.nyc.gov. The rate of wages and supplemental benefits to be paid or provided are those that prevail at the time the work is being performed. Preliminary schedules for future one-year periods are published annually in the City Record on or about June 1st of each succeeding year. Final schedules are published on or about July 1st in the City Record and on our web site at www.comptroller.nyc.gov.

The Comptroller's Office has attempted to include all overtime, shift and night differential, Holiday, Saturday, Sunday or other premium time work. However, this schedule does not set forth every prevailing practice with respect to such rates with which employers must comply. All such practices are nevertheless part of the employer's prevailing wage obligation and contained in the collective bargaining agreements of the prevailing wage unions. These collective bargaining agreements are available for inspection by appointment. Requests for appointments may be made by calling (212) 669-4443, Monday through Friday between the hours of 9 a.m. and 5 p.m.

Answers to questions concerning prevailing trade practices may be obtained from the Classification Unit by calling (212) 669-7974. Please direct all other compliance issues to: Bureau of Labor Law, Attn: Wasyl Kinach, P.E., Office of the Comptroller, 1 Centre Street, Room 1122, New York, N.Y. 10007; Fax (212) 669-4002.

Prevailing rates and ratios for apprentices are attached to this schedule in the Appendix. 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 employed on a public work project. Workers who are not journey persons or not registered apprentices pursuant to Labor Law §220 (3-e) may not be substituted for apprentices and must be paid as journey persons.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Prevailing Rate Schedule Information: The information below is intended to assist you in meeting your prevailing wage rate obligation.

Covered Workers: Any and all individuals who are engaged, employed or otherwise occupied as Workers, Laborers or Mechanics on the public work site.

Contractors are advised to review the applicable Collective Bargaining Agreements and the Comptroller's Prevailing Wage Schedule before bidding on Public Work. If there are any questions concerning prevailing wages, benefits, overtime, Holiday pay, shift differentials or any prevailing practice, please contact this office.

Public Work construction, reconstruction, demolition, excavation, rehabilitation, repair, renovation, alteration, or improvement contracts 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 <http://www.nyc.gov/html/mocs/html/vendors/pla.shtml>.

All the provisions of Labor Law section 220 remain applicable to PLA work including, but not limited to, the enforcement of prevailing wage requirements by the Comptroller; however, we will enforce shift, premium, overtime and other non-standard rates as they appear in a project's pre-negotiated labor agreement.

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.

In order to meet their obligation to provide prevailing supplemental benefits to each covered employee, employers must either:

- 1) Provide bona-fide 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 benefits and wage supplements which cost the employer no less than the prevailing supplemental benefits rate in total.

Particular attention should be given to the supplemental benefits requirement. Although in most instances the payment or provision for supplemental benefits is for each hour worked, some classifications require the payment or provision of supplemental benefits for each hour paid. Consequently, some prevailing practices require benefits to be purchased at the overtime, shift differential, Holiday, Saturday, Sunday or other premium time rate.

Benefits are paid for EACH HOUR WORKED unless otherwise noted.

Wasył Kinach, P.E.
Director of Classifications
Bureau of Labor Law

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

220 SCHEDULE OF PREVAILING WAGES AND SUPPLEMENTAL BENEFITS ADDENDUM
EFFECTIVE PERIOD JANUARY 1, 2013 THROUGH JUNE 30, 2013

List of Amended Classifications

1. BOILERMAKER
2. CEMENT MASON
3. DERRICKPERSON AND RIGGER
4. DRIVER: TRUCK (TEAMSTER)
5. ENGINEER - FIELD (BUILDING CONSTRUCTION)
6. ENGINEER - OPERATING
7. HEAT AND FROST INSULATOR
8. HOUSE WRECKER
9. IRON WORKER - ORNAMENTAL
10. IRON WORKER - STRUCTURAL
11. MASON TENDER
12. MASON TENDER (INTERIOR DEMOLITION WORKER)
13. MOSAIC MECHANIC
14. PAPERHANGER
15. PLASTERER
16. PLASTERER - TENDER
17. PLUMBER
18. PLUMBER (MECHNICAL EQUIPMENT AND SERVICE)
19. PLUMBER (RESIDENTIAL RATES FOR 1, 2 AND 3 FAMILY HOME CONSTRUCTION)
20. ROOFER

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

21. SHEET METAL WORKER

22. SIGN ERECTOR

23. STEAMFITTER

24. STEAMFITTER - REFRIGERATION AND AIR CONDITIONER

25. TILE FINISHER

26. TILE LAYER - SETTER

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

TABLE OF CONTENTS

<u>CLASSIFICATION</u>	<u>PAGE</u>
ASBESTOS HANDLER.....	7
BLASTER.....	7
BOILERMAKER.....	9
BRICKLAYER.....	11
CARPENTER - BUILDING COMMERCIAL.....	11
CARPENTER - HEAVY CONSTRUCTION WORK.....	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.....	22
ELECTRICIAN - ALARM TECHNICIAN.....	24
ELECTRICIAN-STREET LIGHTING WORKER.....	26
ELEVATOR CONSTRUCTOR.....	27
ELEVATOR REPAIR & MAINTENANCE.....	28
ENGINEER.....	28
ENGINEER - CITY SURVEYOR AND CONSULTANT.....	34
ENGINEER - FIELD (BUILDING CONSTRUCTION).....	34
ENGINEER - FIELD (HEAVY CONSTRUCTION).....	36
ENGINEER - FIELD (STEEL ERECTION).....	37
ENGINEER - OPERATING.....	38
FLOOR COVERER.....	47
GLAZIER.....	48
GLAZIER - REPAIR & MAINTENANCE.....	49
HEAT AND FROST INSULATOR.....	50
HOUSE WRECKER.....	51
IRON WORKER - ORNAMENTAL.....	52
IRON WORKER - STRUCTURAL.....	53
LABORER.....	54
LANDSCAPING.....	55
MARBLE MECHANIC.....	57
MASON TENDER.....	58
MASON TENDER (INTERIOR DEMOLITION WORKER).....	59
METALLIC LATHER.....	60

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

MILLWRIGHT	61
MOSAIC MECHANIC	61
PAINTER	63
PAINTER - SIGN	64
PAINTER - STRIPER	65
PAINTER - STRUCTURAL STEEL	66
PAPERHANGER	67
PAVER AND ROADBUILDER	68
PLASTERER	69
PLASTERER - TENDER	70
PLUMBER	71
PLUMBER (MECHANICAL EQUIPMENT AND SERVICE)	72
PLUMBER (RESIDENTIAL RATES FOR 1, 2 AND 3 FAMILY HOME CONSTRUCTION)	73
PLUMBER: PUMP & TANK	74
POINTER - WATERPROOFER, CAULKER MECHANIC (EXTERIOR BUILDING RENOVATION) ..	75
ROOFER	75
SANDBLASTER - STEAMBLASTER	76
SHEET METAL WORKER	77
SHEET METAL WORKER - SPECIALTY	78
SIGN ERECTOR	79
STEAMFITTER	80
STEAMFITTER - REFRIGERATION AND AIR CONDITIONER	82
STONE MASON - SETTER	84
TAPER	85
TELECOMMUNICATION WORKER	86
TILE FINISHER	87
TILE LAYER - SETTER	88
TIMBERPERSON	89
TUNNEL WORKER	89
WELDER	91

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

ASBESTOS HANDLER

(Hazardous Material; Disturbs, removes, encapsulates, repairs, or encloses friable asbestos material)

Asbestos Handler

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$35.10

Supplemental Benefit Rate per Hour: \$14.85

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 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)

BLASTER

Blaster

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$43.20

Supplemental Benefit Rate per Hour: \$37.29

Blaster (Hydraulic)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$43.95

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Supplemental Benefit Rate per Hour: \$37.29

Blaster - Trac Drill Hydraulic

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$38.96

Supplemental Benefit Rate per Hour: \$37.29

Blaster - Wagon: Air Trac: Quarry Bar: Drillrunners

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$38.24

Supplemental Benefit Rate per Hour: \$37.29

Blaster - Operators of Jack Hammers

Chippers: Spaders: Concrete Breakers: and all other pneumatic tools of like usage: Walk Behind Self Propelled Hydraulic Asphalt and Concrete Breakers: Hydro (Water) Demolition

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$37.29

Supplemental Benefit Rate per Hour: \$37.29

Blaster - Powder Carriers

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$33.73

Supplemental Benefit Rate per Hour: \$37.29

Blaster - Hydraulic Trac Drill Chuck Tender

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$32.57

Supplemental Benefit Rate per Hour: \$37.29

Blaster - Chuck Tender & Nipper

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$31.88

Supplemental Benefit Rate per Hour: \$37.29

Blaster - Magazine Keepers: (Watch Person)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$19.26

Supplemental Benefit Rate per Hour: \$37.29

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Overtime Description

For Blaster - Magazine Keepers: (Watch Person) only - time and one half the regular rate for work after an 8 hour day, Saturday, Sunday and holidays listed below.

Overtime

Double time 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

Presidential Election Day

Thanksgiving Day

Christmas Day

Paid Holidays

None

Shift Rates

A single shift shall be 8 hours plus an unpaid lunch, starting at 8:00 A.M. (or between 6:00 A.M. and 10:00 A.M. on weekdays). When two (2) shifts are employed, each shift shall be 8 hours plus ½ hour unpaid lunch. When three (3) shifts are employed, each shift will work seven and one-half (7 ½) hours, but will be paid for eight (8) hours, since only one-half (½) hour is allowed for mealtime. When two (2) or more shifts are employed, single time will be paid for each shift. The first 8 hours of any and all work performed Monday through Friday inclusive of any off-shift shall be at the single time rate.

(Local #29)

BOILERMAKER

Boilermaker

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$47.98

Supplemental Benefit Rate per Hour: \$37.88

Supplemental Note: The above rate applies to repair or maintenance and new construction; For time and one half overtime - \$56.36; For double overtime - \$74.86.

Effective Period: 1/1/2013 - 3/31/2013

Wage Rate per Hour: \$49.47

Supplemental Benefit Rate per Hour: \$39.48

**OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE**

Supplemental Note: The above rate applies to repair or maintenance and new construction; For time and one half overtime - \$58.78; For double overtime - \$78.07.

Effective Period: 4/1/2013 - 6/30/2013

Wage Rate per Hour: \$49.47

Supplemental Benefit Rate per Hour: \$39.78

Supplemental Note: The above rate applies to repair or maintenance and new construction; For time and one half overtime - \$59.08; For double overtime - \$78.37.

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

When shifts are required, the first shift shall work eight (8) hours at the regular straight-time hourly rate. The second shift shall work seven and one-half (7 ½) hours and receive eight hours at the regular straight time hourly rate plus twenty-five cents (\$0.25) per hour. The third shift shall work seven (7) hours and receive eight hours at the regular straight time hourly rate plus fifty cents (\$0.50) per hour. A thirty (30) minute lunch period shall not be considered as time worked. Work in excess of the above shall be paid overtime at the appropriate new construction work or repair work overtime wage and supplemental benefit hourly rate.

(Local #5)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

BRICKLAYER

Bricklayer

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$46.44

Supplemental Benefit Rate per Hour: \$27.53

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.

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

Memorial Day

Independence Day

Labor Day

Thanksgiving Day

Christmas Day

Paid Holidays

None

Shift Rates

Overtime rates to be paid outside the regular scheduled work day.

(Bricklayer District Council)

CARPENTER - BUILDING COMMERCIAL

Building Commercial

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$46.15

Supplemental Benefit Rate per Hour: \$38.50

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.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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
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.

(Carpenters District Council)

CARPENTER - HEAVY CONSTRUCTION WORK (Construction of Engineering Structures and Building Foundations)

Heavy Construction Work

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$46.74

Supplemental Benefit Rate per Hour: \$42.37

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

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 10:00 P.M. shall work eight and one half hours allowing for one half hour for lunch, but will be paid for 9 hours including benefits at the straight time rate for 8 hours.

(Carpenters District Council)

CEMENT & CONCRETE WORKER

Cement & Concrete Worker

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$38.98**

Supplemental Benefit Rate per Hour: **\$25.67**

Supplemental Note: **\$28.42** on Saturdays; **\$31.17** 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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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)

CEMENT MASON

Cement Mason

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$42.50

Supplemental Benefit Rate per Hour: \$39.06

Supplemental Note: Overtime supplemental benefit rate per hour: \$57.56

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$37.63

Supplemental Benefit Rate per Hour: \$39.06

Supplemental Note: Overtime supplemental benefit rate per hour: \$57.56

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

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.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Shift Rates

For an off shift day, (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)

CORE DRILLER

Core Driller

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$35.44**

Supplemental Benefit Rate per Hour: **\$19.75**

Core Driller Helper

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$28.60**

Supplemental Benefit Rate per Hour: **\$19.75**

Core Driller Helper(Third year in the industry)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$25.74**

Supplemental Benefit Rate per Hour: **\$19.75**

Core Driller Helper (Second year in the industry)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$22.88**

Supplemental Benefit Rate per Hour: **\$19.75**

Core Driller Helper (First year in the industry)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$20.02**

Supplemental Benefit Rate per Hour: **\$19.75**

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.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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
Thanksgiving Day
Christmas Day

Shift Rates

The shift day shall be the continuous eight and one-half (8½) hours from 6:00 A.M. to 2:30 P.M. and from 2:30 P.M. to 11:00 P.M., including one-half (½) hour of employees regular rate of pay for lunch. 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 seventy-five cents (\$0.75) 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: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$40.50

Supplemental Benefit Rate per Hour: \$42.07

Supplemental Note: The above supplemental rate applies for work performed in Manhattan, Bronx, Brooklyn and Queens. \$43.49 - For work performed in Staten Island.

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$41.00

Supplemental Benefit Rate per Hour: \$46.07

Supplemental Note: The above supplemental rate applies for work performed in Manhattan, Bronx, Brooklyn and Queens. \$47.49 - For work performed in Staten Island.

Derrick Person & Rigger - Site Work

For site work where no rigging is involved.

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$30.00

Supplemental Benefit Rate per Hour: \$31.32

Overtime Description

**OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE**

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. Deduct \$1.42 from the Staten Island hourly benefits rate before computing overtime.

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: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$58.95

Supplemental Benefit Rate per Hour: \$42.37

Diver Tender (Marine)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$42.10

Supplemental Benefit Rate per Hour: \$42.37

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).

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$46.74

Supplemental Benefit Rate per Hour: \$42.37

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

None

Shift Rates

Off shift work, commencing between 5:00 P.M. and 10:00 P.M., shall work eight and one half hours allowing for one half hour for lunch but will be paid the straight time hourly wage for 9 hours and the straight time supplemental benefits for 8 hours.

(Carpenters District Council)

DRIVER: TRUCK (TEAMSTER)

Driver - Automobile Chauffeur (Dump Truck)

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: **\$35.84**

Supplemental Benefit Rate per Hour: **\$36.93**

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: **\$37.01**

Supplemental Benefit Rate per Hour: **\$38.65**

Driver - Heavy Equipment Trailer Driver

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: **\$37.34**

Supplemental Benefit Rate per Hour: **\$36.93**

Note: For time and one half overtime Wage Rate - \$53.76; for double time overtime Wage Rate - \$71.68

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: **\$38.51**

Supplemental Benefit Rate per Hour: **\$38.65**

Note: For time and one half overtime Wage Rate - \$55.51; for double time overtime Wage Rate - \$74.01

Driver - Euclid & Turnapull Operator

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: **\$36.41**

Supplemental Benefit Rate per Hour: **\$36.93**

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: **\$37.57**

Supplemental Benefit Rate per Hour: **\$38.65**

Driver - Six Wheeler(3 Axle) Tractors & Trailers

**OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE**

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$36.84

Supplemental Benefit Rate per Hour: \$36.93

Note: For time and one half overtime Wage Rate - \$54.62; for double time overtime Wage Rate - \$72.82

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$38.01

Supplemental Benefit Rate per Hour: \$38.65

Note: For time and one half overtime Wage Rate - \$56.36; for double time overtime Wage Rate - \$75.14

Driver - Boom Truck

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$37.09

Supplemental Benefit Rate per Hour: \$36.93

Note: For time and one half overtime Wage Rate - \$54.62; for double time overtime Wage Rate - \$72.82

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$38.26

Supplemental Benefit Rate per Hour: \$38.65

Note: For time and one half overtime Wage Rate - \$56.36; for double time overtime Wage Rate - \$75.14

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. For Thanksgiving week, the prorated share shall be 5 1/3 hours of holiday pay for each day worked in Thanksgiving week.

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).

President's Day

Columbus Day

Veteran's Day

Day after Thanksgiving

Triple time the regular rate for work on the following holiday(s).

New Year's Day

Memorial Day

Independence Day

Labor Day

Presidential Election Day

Thanksgiving Day

Christmas Day

Paid Holidays

New Year's Day

President's Day

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Driver - Redi-Mix Driver (Sand & Gravel)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$37.47

Supplemental Benefit Rate per Hour: \$38.65

Overtime Description

For Paid Holidays: Employees working two (2) days in the calendar week in which the holiday falls are to paid for these holidays, provided they shape each remaining workday during that calendar week.

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).

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
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

(Local #282)

ELECTRICIAN

(Including all low voltage cabling carrying data; video; and voice in combination with data and or video.)

Electrician "A" (Regular Day)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$51.00

Supplemental Benefit Rate per Hour: \$42.45

Electrician "A" (Regular Day Overtime)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$76.50

Supplemental Benefit Rate per Hour: \$45.13

Electrician "A" (Day Shift)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$51.00

Supplemental Benefit Rate per Hour: \$42.45

Electrician "A" (Day Shift Overtime After 8 hours)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$76.50

Supplemental Benefit Rate per Hour: \$45.13

Electrician "A" (Swing Shift)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$59.84

Supplemental Benefit Rate per Hour: \$48.20

Electrician "A" (Swing Shift Overtime After 7.5 hours)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$89.76

Supplemental Benefit Rate per Hour: \$51.36

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Electrician "A" (Graveyard Shift)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$67.03

Supplemental Benefit Rate per Hour: \$53.07

Electrician "A" (Graveyard Shift Overtime After 7 hours)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$100.55

Supplemental Benefit Rate per Hour: \$56.60

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

When so elected by the Employer, one or more shifts of at least five days duration may be scheduled as follows:

Day Shift: 8:00 am to 4:30 pm, Swing Shift 4:30 pm to 12:30 am, Graveyard Shift: 12:30 am to 8:00 am.

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.

Electrician "M" (First 8 hours)

"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,

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

maintain and repair all kinds of lighting fixtures and local lighting controls and washing and cleaning of foregoing fixtures.

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$25.30

Supplemental Benefit Rate per Hour: \$17.52

Electrician "M" (Overtime After First 8 hours)

"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: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$37.95

Supplemental Benefit Rate per Hour: \$18.85

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)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Alarm Technician

Effective Period: 7/1/2012 - 3/9/2013

Wage Rate per Hour: **\$29.90**

Supplemental Benefit Rate per Hour: **\$13.70**

Supplemental Note: \$12.20 only after 8 hours worked in a day

Effective Period: 3/10/2013 - 6/30/2013

Wage Rate per Hour: **\$30.40**

Supplemental Benefit Rate per Hour: **\$13.90**

Supplemental Note: \$12.40 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.

Double time 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 8:00 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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

(Local #3)

ELECTRICIAN-STREET LIGHTING WORKER

Electrician - Electro Pole Electrician

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$51.00

Supplemental Benefit Rate per Hour: \$44.18

Electrician - Electro Pole Foundation Installer

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$38.66

Supplemental Benefit Rate per Hour: \$34.12

Electrician - Electro Pole Maintainer

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$33.10

Supplemental Benefit Rate per Hour: \$30.84

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

(Local #3)

ELEVATOR CONSTRUCTOR

Elevator Constructor

Effective Period: 7/1/2012 - 3/16/2013

Wage Rate per Hour: \$55.20

Supplemental Benefit Rate per Hour: \$32.78

Effective Period: 3/17/2013 - 6/30/2013

Wage Rate per Hour: \$57.01

Supplemental Benefit Rate per Hour: \$34.48

Overtime Description

For New Construction: work performed after 7 or 8 hour day, Saturday, Sunday or between 4:30pm and 7:00am shall be paid at double time rate.

Existing buildings: work performed after an 8 hour day, Saturday, Sunday or between 5:30pm and 7:00 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)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

ELEVATOR REPAIR & MAINTENANCE

Elevator Service/Modernization Mechanic

Effective Period: 7/1/2012 - 3/16/2013

Wage Rate per Hour: \$43.79

Supplemental Benefit Rate per Hour: \$31.37

Effective Period: 3/17/2013 - 6/30/2013

Wage Rate per Hour: \$45.14

Supplemental Benefit Rate per Hour: \$33.02

Overtime Description

For Service Work: Double time - all work performed on Sundays, Holidays, and between midnight and 7:00am.

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

For Modernization Work (4pm to 12:30am) - regularly hourly rate plus a (15%) fifteen percent differential.

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

**OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE**

Cherry pickers 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: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$58.75**

Supplemental Benefit Rate per Hour: **\$31.07**

Supplemental Note: \$55.74 on overtime

Shift Wage Rate: **\$94.00**

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, Cherry pickers. 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 man auger.

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$57.00**

Supplemental Benefit Rate per Hour: **\$31.07**

Supplemental Note: \$55.74 on overtime

Shift Wage Rate: **\$91.20**

Engineer - Heavy Construction Maintenance Engineer I

Installing, Repairing, Maintaining, Dismantling and Manning 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: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$56.74**

Supplemental Benefit Rate per Hour: **\$31.07**

Supplemental Note: \$55.74 on overtime

Shift Wage Rate: **\$90.78**

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Engineer - Heavy Construction Maintenance Engineer II

On Base Mounted Tower Cranes

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$74.44

Supplemental Benefit Rate per Hour: \$31.07

Supplemental Note: \$55.74 on overtime

Shift Wage Rate: \$119.10

Engineer - Heavy Construction Maintenance Engineer III

On Generators, Light Towers

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$37.56

Supplemental Benefit Rate per Hour: \$31.07

Supplemental Note: \$55.74 on overtime

Shift Wage Rate: \$60.10

Engineer - Heavy Construction Maintenance Engineer IV

On Pumps and Mixers including mud sucking

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$38.53

Supplemental Benefit Rate per Hour: \$31.07

Supplemental Note: \$55.74 on overtime

Shift Wage Rate: \$61.65

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: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$54.09

Supplemental Benefit Rate per Hour: \$31.07

Supplemental Note: \$55.74 on overtime

Shift Wage Rate: \$86.54

Engineer - Heavy Construction Oilers I

Gradalls, Cold Planer Grader, Concrete Pumps, Driving Truck Cranes, Driving and Operating Fuel and Grease Trucks.

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$51.19

**OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE**

Supplemental Benefit Rate per Hour: \$31.07
Supplemental Note: \$55.74 on overtime
Shift Wage Rate: \$81.90

Engineer - Heavy Construction Oilers II

All gasoline, electric, diesel or air operated Shovels, Draglines, Backhoes, Keystones, Pavers, Guniting Machines, Battery of Compressors, Crawler Cranes, two-person Trenching Machines.

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate per Hour: \$35.50
Supplemental Benefit Rate per Hour: \$31.07
Supplemental Note: \$55.74 on overtime
Shift Wage Rate: \$56.80

Engineer - Steel Erection Maintenance Engineers

Derrick, Travelers, Tower, Crawler Tower and Climbing Cranes

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate per Hour: \$54.33
Supplemental Benefit Rate per Hour: \$29.66
Supplemental Note: \$53.17 on overtime
Shift Wage Rate: \$86.93

Engineer - Steel Erection Oiler I

On a Truck Crane

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate per Hour: \$50.91
Supplemental Benefit Rate per Hour: \$29.66
Supplemental Note: \$53.17 on overtime
Shift Wage Rate: \$81.46

Engineer - Steel Erection Oiler II

On a Crawler Crane

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate per Hour: \$39.04
Supplemental Benefit Rate per Hour: \$29.66
Supplemental Note: \$53.17 on overtime
Shift Wage Rate: \$62.46

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.

**OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE**

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

Lincoln's Birthday

President's Day

Memorial Day

Independence Day

Labor Day

Columbus Day

Election Day

Veteran's Day

Thanksgiving Day

Christmas Day

Employees must work at least one day in the payroll week in which the holiday occurs to receive the paid holiday

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: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$51.62

Supplemental Benefit Rate per Hour: \$29.66

Supplemental Note: \$53.17 on overtime

Engineer - Building Work Maintenance Engineers II

On Pumps, Generators, Mixers and Heaters

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$40.34

Supplemental Benefit Rate per Hour: \$29.66

Supplemental Note: \$53.17 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

**OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE**

Cranes: Driving and Operating Fuel and Grease Trucks, Cherrypickers (hydraulic cranes) over 70,000 GVW, and machines of a similar nature.

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$49.12

Supplemental Benefit Rate per Hour: \$29.66

Supplemental Note: \$53.17 on overtime

Engineer - Building Work Oilers II

Oilers on Crawler Cranes, Backhoes, Trenching Machines, Gunite Machines, Compressors (three or more in Battery).

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$36.75

Supplemental Benefit Rate per Hour: \$29.66

Supplemental Note: \$53.17 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

Lincoln's Birthday

President's Day

Memorial Day

Independence Day

Labor Day

Columbus Day

Veteran's Day

Thanksgiving Day

Christmas Day

Employees must work at least one day in the payroll week in which the holiday occurs to receive the paid holiday

Shift Rates

Off Shift: double time the regular hourly rate.

(Local #15)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

ENGINEER - CITY SURVEYOR AND CONSULTANT

Party Chief

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate per Hour: \$34.61
Supplemental Benefit Rate per Hour: \$17.30

Instrument Person

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate per Hour: \$28.59
Supplemental Benefit Rate per Hour: \$17.30

Rodperson

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate per Hour: \$24.79
Supplemental Benefit Rate per Hour: \$17.30

Overtime Description

Overtime Benefit Rate - \$23.63 per hour (time & one half) \$29.95 per hour (double time).
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
Lincoln's Birthday
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.)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Field Engineer - BC Party Chief

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$53.64

Supplemental Benefit Rate per Hour: \$26.95

Supplemental Note: Overtime Benefit Rate - \$37.48 per hour (time & one half) \$48.00 per hour (double time).

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$55.74

Supplemental Benefit Rate per Hour: \$29.73

Supplemental Note: Overtime Benefit Rate - \$41.40 per hour (time & one half) \$53.06 per hour (double time).

Field Engineer - BC Instrument Person

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$41.94

Supplemental Benefit Rate per Hour: \$26.95

Supplemental Note: Overtime Benefit Rate - \$37.48 per hour (time & one half) \$48.00 per hour (double time).

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$43.30

Supplemental Benefit Rate per Hour: \$29.73

Supplemental Note: Overtime Benefit Rate - \$41.40 per hour (time & one half) \$53.06 per hour (double time).

Field Engineer - BC Rodperson

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$27.52

Supplemental Benefit Rate per Hour: \$26.95

Supplemental Note: Overtime Benefit Rate - \$37.48 per hour (time & one half) \$48.00 per hour (double time).

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$27.97

Supplemental Benefit Rate per Hour: \$29.73

Supplemental Note: Overtime Benefit Rate - \$41.40 per hour (time & one half) \$53.06 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
President's Day
Good Friday
Memorial Day
Independence Day
Labor Day
Columbus Day
Veteran's Day

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

Thanksgiving Day

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: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$60.28

Supplemental Benefit Rate per Hour: \$29.73

Supplemental Note: Overtime benefit rate - \$41.40 per hour (time & one half), \$53.06 per hour (double time).

Field Engineer - HC Instrument Person

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$44.28

Supplemental Benefit Rate per Hour: \$29.73

Supplemental Note: Overtime benefit rate - \$41.40 per hour (time & one half), \$53.06 per hour (double time).

Field Engineer - HC Rodperson

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$37.11

Supplemental Benefit Rate per Hour: \$29.73

Supplemental Note: Overtime benefit rate - \$41.40 per hour (time & one half), \$53.06 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

Lincoln's Birthday

President's Day

Memorial Day

Independence Day

Labor Day

Columbus Day

Veteran's Day

**OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE**

Thanksgiving Day
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: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$54.50**

Supplemental Benefit Rate per Hour: **\$26.95**

Supplemental Note: Overtime benefit rate - \$37.48 per hour (time & one half), \$48.00 per hour (double time).

Field Engineer - Steel Erection Instrument Person

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$42.63**

Supplemental Benefit Rate per Hour: **\$26.95**

Supplemental Note: Overtime benefit rate - \$37.48 per hour (time & one half), \$48.00 per hour (double time).

Field Engineer - Steel Erection Rodperson

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$28.84**

Supplemental Benefit Rate per Hour: **\$26.95**

Supplemental Note: Overtime benefit rate - \$37.48 per hour (time & one half), \$48.00 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
Lincoln's Birthday
President's Day
Memorial Day
Independence Day
Labor Day
Columbus Day

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Veteran's Day
Thanksgiving Day
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 - OPERATING

Operating Engineer - Road & Heavy Construction I

Back Filling Machines, Cranes, Mucking Machines and Dual Drum Paver.

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$64.38

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Shift Wage Rate: \$103.01

Operating Engineer - Road & Heavy Construction II

Backhoes, Power Shovels, Hydraulic Clam Shells, Steel Erection, Moles and machines of a similar nature.

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$66.70

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: 51.85 overtime hours

Shift Wage Rate: \$106.72

Operating Engineer - Road & Heavy Construction III

Mine Hoists, Cranes, etc. (Used as Mine Hoists)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$68.86

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Shift Wage Rate: \$110.18

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: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$67.21

**OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE**

Supplemental Benefit Rate per Hour: \$28.65
Supplemental Note: \$51.85 overtime hours
Shift Wage Rate: \$107.54

Operating Engineer - Road & Heavy Construction V

Pile Drivers & Rigs (employing Dock Builder foreperson): Derrick Boats, Tunnel Shovels.

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate per Hour: \$65.86
Supplemental Benefit Rate per Hour: \$28.65
Supplemental Note: \$51.85 overtime hours
Shift Wage Rate: \$105.38

Operating Engineer - Road & Heavy Construction VI

Mixers (Concrete with loading attachment), Concrete Pavers, Cableways, Land Derricks, Power Houses (Low Air Pressure Units).

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate per Hour: \$62.51
Supplemental Benefit Rate per Hour: \$28.65
Supplemental Note: \$51.85 overtime hours
Shift Wage Rate: \$100.02

Operating Engineer - Road & Heavy Construction VII

Barrier Movers , Barrier Transport and Machines of a Similar Nature.

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate per Hour: \$50.27
Supplemental Benefit Rate per Hour: \$28.65
Supplemental Note: \$51.85 overtime hours
Shift Wage Rate: \$80.43

Operating Engineer - Road & Heavy Construction VIII

Utility Compressors

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate per Hour: \$36.37
Supplemental Benefit Rate per Hour: \$28.65
Supplemental Note: \$51.85 overtime hours
Shift Wage Rate: \$46.38

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate per Hour: \$38.78
Supplemental Benefit Rate per Hour: \$28.65
Supplemental Note: \$51.85 overtime hours

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Shift Wage Rate: \$49.16

Operating Engineer - Road & Heavy Construction IX

Horizontal Boring Rig

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$56.24

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Shift Wage Rate: \$89.98

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$59.39

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Shift Wage Rate: \$95.02

Operating Engineer - Road & Heavy Construction X

Elevators (manually operated as personnel hoist).

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$54.50

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Shift Wage Rate: \$87.20

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: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$42.11

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Shift Wage Rate: \$67.38

Operating Engineer - Road & Heavy Construction XII

All Drills and Machines of a similar nature.

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$63.18

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Shift Wage Rate: \$101.09

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Operating Engineer - Road & Heavy Construction XIII

Concrete Pumps, Concrete Plant, Well Drilling Machines, Stone Crushers, Double Drum Hoist, Power Houses (other than above).

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$61.14

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Shift Wage Rate: \$97.82

Operating Engineer - Road & Heavy Construction XIV

Concrete Mixer

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$58.34

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Shift Wage Rate: \$93.49

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: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$39.03

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Shift Wage Rate: \$62.45

Operating Engineer - Road & Heavy Construction XVI

Concrete Breaking Machines, Single Drum Hoists, Locomotives (over ten tons) and Dinkies over ten tons, Hydraulic Crane-Second Engineer.

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$55.73

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Shift Wage Rate: \$89.17

Operating Engineer - Road & Heavy Construction XVII

On-Site concrete plant engineer, On-site Asphalt Plant Engineer, and Vibratory console.

**OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE**

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$56.19

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Shift Wage Rate: \$89.90

Operating Engineer - Road & Heavy Construction XVIII

Tower Crane

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$81.09

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Shift Wage Rate: \$129.74

Operating Engineer - Paving I

Asphalt Spreaders, Autogrades (C.M.I.), Roto/Mil

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$59.25

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Shift Wage Rate: \$94.80

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$62.51

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Shift Wage Rate: \$100.02

Operating Engineer - Paving II

Asphalt Roller

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$57.65

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Shift Wage Rate: \$92.24

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$60.85

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Shift Wage Rate: \$97.36

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Operating Engineer - Paving III

Asphalt Plants

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$48.46

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Shift Wage Rate: \$77.54

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$51.32

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Shift Wage Rate: \$82.11

Operating Engineer - Concrete I

Cranes

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$63.49

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Operating Engineer - Concrete II

Compressors

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$36.91

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Operating Engineer - Concrete III

Micro-traps (Negative Air Machines), Vac-All Remediation System.

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$50.31

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Operating Engineer - Steel Erection I

Three Drum Derricks

Effective Period: 7/1/2012 - 12/31/2012

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Wage Rate per Hour: \$67.62
Supplemental Benefit Rate per Hour: \$28.65
Supplemental Note: \$51.85 overtime hours
Shift Wage Rate: \$108.19

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate per Hour: \$70.50
Supplemental Benefit Rate per Hour: \$28.65
Supplemental Note: \$51.85 overtime hours
Shift Wage Rate: \$112.80

Operating Engineer - Steel Erection II

Cranes, 2 Drum Derricks, Hydraulic Cranes and Fork Lifts.

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate per Hour: \$64.91
Supplemental Benefit Rate per Hour: \$28.65
Supplemental Note: \$51.85 overtime hours
Shift Wage Rate: \$103.86

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate per Hour: \$67.71
Supplemental Benefit Rate per Hour: \$28.65
Supplemental Note: \$51.85 overtime hours
Shift Wage Rate: \$108.34

Operating Engineer - Steel Erection III

Compressors, Welding Machines.

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate per Hour: \$37.87
Supplemental Benefit Rate per Hour: \$28.65
Supplemental Note: \$51.85 overtime hours
Shift Wage Rate: \$60.59

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate per Hour: \$39.86
Supplemental Benefit Rate per Hour: \$28.65
Supplemental Note: \$51.85 overtime hours
Shift Wage Rate: \$63.78

Operating Engineer - Steel Erection IV

Compressors - Not Combined with Welding Machine.

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate per Hour: \$36.00

**OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE**

Supplemental Benefit Rate per Hour: \$28.65
Supplemental Note: \$51.85 overtime hours
Shift Wage Rate: \$57.60

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate per Hour: \$37.93
Supplemental Benefit Rate per Hour: \$28.65
Supplemental Note: \$51.85 overtime hours
Shift Wage Rate: \$60.69

Operating Engineer - Building Work I

Forklifts, House Cars, Rack and Pinion, Plaster (Platform machine), Plaster Bucket, Concrete Pump and all other equipment used for hoisting material.

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate per Hour: \$53.09
Supplemental Benefit Rate per Hour: \$28.65
Supplemental Note: \$51.85 overtime hours

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate per Hour: \$55.46
Supplemental Benefit Rate per Hour: \$28.65
Supplemental Note: \$51.85 overtime hours

Operating Engineer - Building Work II

Compressors, Welding Machines (Cutting Concrete-Tank Work), Paint Spraying, Sandblasting, Pumps (with the exclusion of Concrete Pumps), House Car (settlement basis only), All Engines irrespective of Power (Power-Pac) used to drive Auxiliary Equipment, Air, Hydraulic, etc.

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate per Hour: \$39.35
Supplemental Benefit Rate per Hour: \$28.65
Supplemental Note: \$51.85 overtime hours

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate per Hour: \$41.32
Supplemental Benefit Rate per Hour: \$28.65
Supplemental Note: \$51.85 overtime hours

Operating Engineer - Building Work III

Double Drum

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate per Hour: \$60.66
Supplemental Benefit Rate per Hour: \$28.65
Supplemental Note: \$51.85 overtime hours

**OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE**

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$63.25

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Operating Engineer - Building Work IV

Stone Derrick, Cranes, Hydraulic Cranes Boom Trucks.

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$64.35

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$67.05

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Operating Engineer - Building Work V

Dismantling and Erection of Cranes, Relief Engineer.

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$59.17

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$61.72

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Operating Engineer - Building Work VI

4 Pole Hoist, Single Drum Hoists.

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$58.53

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$61.06

Supplemental Benefit Rate per Hour: \$28.65

Supplemental Note: \$51.85 overtime hours

Overtime Description

**OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE**

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

Lincoln's Birthday

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

Shift Rates

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)

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: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$46.15

Supplemental Benefit Rate per Hour: \$38.50

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.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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

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

Two shifts may be utilized with the first shift working 8:00 A.M. to the end of the shift at the straight time of pay. The second shift will receive one hour at double time rate for the last hour of the shift. (eight for seven, nine for eight).

(Carpenters District Council)

GLAZIER (New Construction, Remodeling, and Alteration)

Glazier

Effective Period: 7/1/2012 - 10/31/2012

Wage Rate per Hour: \$40.00

Supplemental Benefit Rate per Hour: \$32.89

Supplemental Note: Supplemental Benefit Overtime Rate: \$40.54

Effective Period: 11/1/2012 - 6/30/2013

Wage Rate per Hour: \$40.50

Supplemental Benefit Rate per Hour: \$33.24

Supplemental Note: Supplemental Benefit Overtime Rate: \$41.24

Overtime Description

An optional 8th hour can be worked at straight time rate. If 9th hour is worked, then both hours or more (8th & 9th or more) will be at the double time rate of pay.

Overtime

Double time the regular rate after a 7 hour day.

**OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE**

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
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays

None

Shift Rates

Shifts shall be any 7 hours beyond 4:00 P.M. for which the glazier shall receive 8 hours pay for 7 hours worked.

(Local #1281)

GLAZIER - REPAIR & MAINTENANCE

(For the Installation of Glass - All repair and maintenance work on a particular building, whenever performed, where the total cumulative contract value is under \$105,000. Except where enumerated (i.e. plate glass windows) does not apply to non-residential buildings.)

Craft Jurisdiction for repair, maintenance and fabrication

Plate glass replacement, Residential glass replacement, Residential mirrors and shower doors, Storm windows and storm doors, Residential replacement windows, Herculite door repairs, Door closer repairs, Retrofit apartment house (non commercial buildings), Glass tinting.

Effective Period: 7/1/2012 - 4/30/2013

Wage Rate per Hour: **\$23.40**

Supplemental Benefit Rate per Hour: **\$18.04**

Effective Period: 5/1/2013 - 6/30/2013

Wage Rate per Hour: **\$23.50**

Supplemental Benefit Rate per Hour: **\$18.54**

Overtime

Time and one half the regular rate after an 8 hour day.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Double time the regular rate for Sunday.

Time and one half the regular hourly rate after 40 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

(Local #1281)

HEAT AND FROST INSULATOR

Heat & Frost Insulator

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: **\$54.28**

Supplemental Benefit Rate per Hour: **\$31.36**

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: **\$55.98**

Supplemental Benefit Rate per Hour: **\$32.36**

Overtime Description

Double time shall be paid for supplemental benefits during overtime work.
8th hour paid at time and one half.

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
Martin Luther King Jr. Day
President's Day
Memorial Day
Independence Day
Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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.

Off hour work in occupied or retail buildings may be worked on weekdays with an increment of \$1.00 per hour and eight hours pay for seven (7) hours worked. Double time will apply for over seven (7) hours worked on weekdays, weekends or holidays.

(Local #12)

HOUSE WRECKER (TOTAL DEMOLITION)

House Wrecker - Tier A

On all work sites the first, second, eleventh and every third House Wrecker thereafter shall be Tier A House Wreckers (i.e. 1st, 2nd, 11th, 14th etc). The 10th and 20th House Wrecker shall be apprentices. Other House Wreckers shall be Tier B House Wreckers.

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: **\$33.00**

Supplemental Benefit Rate per Hour: **\$24.15**

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: **\$33.51**

Supplemental Benefit Rate per Hour: **\$24.64**

House Wrecker - Tier B

On all work sites the first, second, eleventh and every third House Wrecker thereafter shall be Tier A House Wreckers (i.e. 1st, 2nd, 11th, 14th etc). The 10th and 20th House Wrecker shall be apprentices. Other House Wreckers shall be Tier B House Wreckers.

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: **\$23.05**

Supplemental Benefit Rate per Hour: **\$17.85**

Effective Period: 1/1/2013 - 6/30/2013

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Wage Rate per Hour: **\$23.25**

Supplemental Benefit Rate per Hour: **\$18.35**

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: 7/1/2012 - 12/31/2012

Wage Rate per Hour: **\$41.50**

Supplemental Benefit Rate per Hour: **\$39.52**

Supplemental Note: Supplemental benefits are to be paid at the applicable overtime rate when overtime is in effect.

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: **\$42.00**

Supplemental Benefit Rate per Hour: **\$42.89**

Supplemental Note: Supplemental benefits are to be paid at the applicable overtime rate when overtime is in effect.

Overtime Description

Time and one half the regular rate after a 7 hour day for a maximum of two hours on any regular work day (the 8th and 9th hour) and double time shall be paid for all work on a regular work day thereafter, time and one half the regular rate for Saturday for the first seven hours of work and double time shall be paid for all work on a Saturday thereafter.

Overtime

**OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE**

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

For off shift work - 8 hours pay for 7 hours of work. When two or three shifts are employed on a job, Monday through Friday, the workday for each shift shall be seven hours and paid for ten and one-half hours at the single time rate. When two or three shifts are worked on Saturday, Sunday or holidays, each shift shall be seven hours and paid fifteen and three-quarters hours.

(Local #580)

IRON WORKER - STRUCTURAL

Iron Worker - Structural

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: **\$45.05**

Supplemental Benefit Rate per Hour: **\$57.85**

Supplemental Note: Supplemental benefits are to be paid at the applicable overtime rate when overtime is in effect.

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: **\$46.00**

Supplemental Benefit Rate per Hour: **\$61.23**

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.

Overtime

Time and one half the regular rate after an 8 hour day.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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
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.
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.

(Local #40 & #361)

LABORER

(Foundation, Concrete, Excavating, Street Pipe Layer and Common)

Laborer

Excavation and foundation work for buildings, heavy construction, 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.

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$38.70**

Supplemental Benefit Rate per Hour: **\$31.75**

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).

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

New Year's Day
Memorial Day
Independence Day
Labor Day
Columbus Day
Presidential Election Day
Thanksgiving Day
Christmas Day

Paid Holidays

Labor Day
Thanksgiving 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)

LANDSCAPING

(Landscaping tasks, as well as tree pruning, tree removing, spraying and maintenance in connection with the planting of street trees and the planting of trees in city parks but not when such activities are performed as part of, or in connection with, other construction or reconstruction projects.)

Landscaper (Above 6 years experience)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$24.25

Supplemental Benefit Rate per Hour: \$12.30

Landscaper (3 - 6 years experience)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$23.25

Supplemental Benefit Rate per Hour: \$12.30

Landscaper (up to 3 years experience)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$20.75

Supplemental Benefit Rate per Hour: \$12.30

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

Groundperson

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$20.75

Supplemental Benefit Rate per Hour: \$12.30

Tree Remover / Pruner

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$29.25

Supplemental Benefit Rate per Hour: \$12.30

Landscaper Sprayer (Pesticide Applicator)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$19.25

Supplemental Benefit Rate per Hour: \$12.30

Watering - Plant Maintainer

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$14.25

Supplemental Benefit Rate per Hour: \$12.30

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)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

MARBLE MECHANIC

Marble Setter

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$49.19**

Supplemental Benefit Rate per Hour: **\$32.24**

Marble Finisher

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$39.05**

Supplemental Benefit Rate per Hour: **\$31.43**

Marble Polisher

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$34.73**

Supplemental Benefit Rate per Hour: **\$24.60**

Overtime Description

Supplemental Benefit contributions are to be made at the applicable overtime rates. Time and one half the regular rate after a 7 hour day or time and one half the regular rate after an 8 hour day - chosen by Employer at the start of the project and then would last for the full duration of the project.

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

Veteran's Day

Thanksgiving Day

Day after Thanksgiving

Christmas Day

Paid Holidays

None

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

(Local #7)

MASON TENDER

Mason Tender

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: **\$34.24**

Supplemental Benefit Rate per Hour: **\$24.40**

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: **\$34.50**

Supplemental Benefit Rate per Hour: **\$25.14**

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.

(Local #79)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

MASON TENDER (INTERIOR DEMOLITION WORKER)

(The erection, building, moving, servicing and dismantling of enclosures, scaffolding, barricades, protection and site safety structures etc., on Interior Demolition jobs.)

Mason Tender Tier A

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: **\$33.87**

Supplemental Benefit Rate per Hour: **\$19.22**

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: **\$34.07**

Supplemental Benefit Rate per Hour: **\$19.77**

Mason Tender Tier B

On Interior Demolition job sites 33 1/3 % of the employees shall be classified as Tier A Interior Demolition Workers and 66 2/3 % shall be classified as Tier B Interior Demolition Workers; provided that the employer may employ more than 33 1/3 % Tier A Interior Demolition Workers on the job site. Where the number of employees on a job site is not divisible by 3, the first additional employee (above the number of employees divisible by three) shall be a Tier B Interior Demolition Worker, and the second additional employee shall be a Tier A Interior Demolition Worker.

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: **\$23.07**

Supplemental Benefit Rate per Hour: **\$13.53**

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: **\$23.27**

Supplemental Benefit Rate per Hour: **\$14.08**

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

(Local #79)

METALLIC LATHER

Metallic Lather

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$41.23

Supplemental Benefit Rate per Hour: \$38.35

Supplemental Note: Supplemental benefits for overtime are paid at the appropriate overtime rate.

Overtime Description

Overtime would be time and one half the regular rate after a seven (7) or eight (8) hours workday, which would be set at the start of the job.

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

Washington's Birthday

Good Friday

Memorial Day

Independence Day

Labor Day

Columbus Day

Presidential Election 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

There shall be either two (2) or three (3) shifts, each shift shall be eight (8) hours with nine (9) hours pay, including one half (1/2) hour for lunch. Off-Hour Start shall commence after 3:30 P.M. and shall conclude by 6:00 A.M. The first consecutive seven (7) hours shall be at straight time with a differential of twelve dollars (\$12.00) per hour. Fringes shall be paid at the straight time rate.

(Local #46)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

MILLWRIGHT

Millwright

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$46.19

Supplemental Benefit Rate per Hour: \$45.67

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

Good Friday

Memorial Day

Independence Day

Labor Day

Columbus Day

Presidential Election 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

The first shift shall receive the straight time rate of pay. The second shift receives the straight time rate of pay plus fifteen (15%) per cent. Members of the second shift shall be allowed one half hour to eat, with this time being included in the hours of the workday established. There must be a first shift to work a second shift. All additional hours worked shall be paid at the time and one-half rate of pay plus fifteen (15%) per cent for weekday hours.

(Local #740)

MOSAIC MECHANIC

Mosaic Mechanic - Mosaic & Terrazzo Mechanic

Effective Period: 7/1/2012 - 12/31/2012

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

Wage Rate per Hour: \$43.93

Supplemental Benefit Rate per Hour: \$33.08

Supplemental Note: Supplemental benefits for overtime to be paid at the rate of \$44.05 per hour.

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$44.39

Supplemental Benefit Rate per Hour: \$35.12

Supplemental Note: Supplemental benefits for overtime to be paid at the rate of \$46.09 per hour.

Mosaic Mechanic - Mosaic & Terrazzo Finisher

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$42.36

Supplemental Benefit Rate per Hour: \$33.08

Supplemental Note: Supplemental benefits for overtime to be paid at the rate of \$44.05 per hour.

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$42.78

Supplemental Benefit Rate per Hour: \$35.11

Supplemental Note: Supplemental benefits for overtime to be paid at the rate of \$46.08 per hour.

Mosaic Mechanic - Machine Operator Grinder

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$42.36

Supplemental Benefit Rate per Hour: \$33.08

Supplemental Note: Supplemental benefits for overtime to be paid at the rate of \$44.05 per hour.

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$42.78

Supplemental Benefit Rate per Hour: \$35.11

Supplemental Note: Supplemental benefits for overtime to be paid at the rate of \$46.08 per hour.

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

Washington's Birthday

Good Friday

Independence Day

Labor Day

Columbus Day

Veteran's Day

Thanksgiving Day

Day after Thanksgiving

Christmas Day

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Paid Holidays

None

(Local #7)

PAINTER

Painter - Brush & Roller

Effective Period: 7/1/2012 - 10/31/2012

Wage Rate per Hour: \$35.50

Supplemental Benefit Rate per Hour: \$25.12

Supplemental Note: \$29.75 on overtime

Effective Period: 11/1/2012 - 4/30/2013

Wage Rate per Hour: \$36.00

Supplemental Benefit Rate per Hour: \$25.12

Supplemental Note: \$29.75 on overtime

Effective Period: 5/1/2013 - 6/30/2013

Wage Rate per Hour: \$37.50

Supplemental Benefit Rate per Hour: \$25.12

Supplemental Note: \$29.75 on overtime

Spray & Scaffold / Decorative / Sandblast

Effective Period: 7/1/2012 - 10/31/2012

Wage Rate per Hour: \$38.50

Supplemental Benefit Rate per Hour: \$25.12

Supplemental Note: \$29.75 on overtime

Effective Period: 11/1/2012 - 4/30/2013

Wage Rate per Hour: \$39.00

Supplemental Benefit Rate per Hour: \$25.12

Supplemental Note: \$29.75 on overtime

Effective Period: 5/1/2013 - 6/30/2013

Wage Rate per Hour: \$40.50

Supplemental Benefit Rate per Hour: \$25.12

Supplemental Note: \$29.75 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.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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
Thanksgiving Day
Christmas Day

Paid Holidays

None

(District Council of Painters #9)

PAINTER - SIGN

Designer

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$36.15

Supplemental Benefit Rate per Hour: \$9.66

Journey person

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$33.62

Supplemental Benefit Rate per Hour: \$9.66

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.

Double time 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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Christmas Day

Shift Rates

All work performed outside the regular 8 hour work day (either 7:00 A.M to 3:30 P.M or 8:00 A.M. to 4:30 P.M) shall be paid at time and one half the regular hourly rate.

(Local #8A-28A)

PAINTER - STRIPER

Striper (paint)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$33.00**

Supplemental Benefit Rate per Hour: **\$11.52**

Supplemental Note: Overtime Supplemental Benefit rate - \$7.42; New Hire Rate (0-3 months) - \$0.00

Lineperson (thermoplastic)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$37.00**

Supplemental Benefit Rate per Hour: **\$11.52**

Supplemental Note: Overtime Supplemental Benefit rate - \$7.42; New Hire Rate (0-3 months) - \$0.00

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

Good Friday

Memorial Day

Independence Day

Labor Day

Columbus Day

Presidential Election Day

Thanksgiving Day

Day after Thanksgiving

Christmas Day

Shift Rates

Employees hired before April 1, 2003: 15% night shift premium differential for work commenced at 9:00 PM or later.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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. Vacation must be taken during winter months. 2 Personal Days except employees hired after 4/1/12 who do not have 2 years of service.

(Local #917)

PAINTER - STRUCTURAL STEEL

Painters on Structural Steel

Effective Period: 7/1/2012 - 9/30/2012

Wage Rate per Hour: **\$46.25**

Supplemental Benefit Rate per Hour: **\$31.58**

Effective Period: 10/1/2012 - 6/30/2013

Wage Rate per Hour: **\$47.00**

Supplemental Benefit Rate per Hour: **\$32.08**

Painter - Power Tool

Effective Period: 7/1/2012 - 9/30/2012

Wage Rate per Hour: **\$52.25**

Supplemental Benefit Rate per Hour: **\$31.58**

Effective Period: 10/1/2012 - 6/30/2013

Wage Rate per Hour: **\$53.00**

Supplemental Benefit Rate per Hour: **\$32.08**

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

Memorial Day

Independence Day

Labor Day

Thanksgiving Day

Christmas Day

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

Paid Holidays

None

Shift Rates

Regular hourly rates plus a ten per cent (10%) differential

(Local #806)

PAPERHANGER

Paperhanger

Effective Period: 7/1/2012 - 4/30/2013

Wage Rate per Hour: **\$37.44**

Supplemental Benefit Rate per Hour: **\$29.23**

Supplemental Note: Supplemental benefits are to be paid at the appropriate straight time and overtime rate.

Effective Period: 5/1/2013 - 6/30/2013

Wage Rate per Hour: **\$39.00**

Supplemental Benefit Rate per Hour: **\$29.23**

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.

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

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.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

(District Council of Painters #9)

PAVER AND ROADBUILDER

Paver & Roadbuilder - Formsetter

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$42.86**

Supplemental Benefit Rate per Hour: **\$32.15**

Paver & Roadbuilder - Laborer

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 before the installation of rubberized materials and similar surfaces; installation and repair of temporary construction fencing; slurry seal coating, maintenance of safety surfaces; play equipment installation, and other related work.

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$38.99**

Supplemental Benefit Rate per Hour: **\$32.15**

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: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$45.00**

Supplemental Benefit Rate per Hour: **\$32.15**

Production Paver & Roadbuilder - Raker

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$44.49**

Supplemental Benefit Rate per Hour: **\$32.15**

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: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$41.20**

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

Supplemental Benefit Rate per Hour: \$32.15

Overtime Description

Veteran's Day is a Paid Holiday for employees working on production paving.

If an employee works New Year's Day or Christmas Day, they receive the single time rate plus 15%, except if an employee works on production paving on New Year's Day or Christmas Day, they receive the single time rate plus one day's pay for the holiday worked.

Employees who work on a holiday listed below receive the straight time rate plus one day's pay 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.

Paid Holidays

Memorial Day

Independence Day

Labor Day

Columbus Day

Election 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 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.

Night Work - On night work, the first eight (8) hours of work will be paid for at fifteen percent (15%) over the single time rate, except that production paving work shall be paid at 25% over the single time rate. Hours worked over eight (8) hours during said shift shall be paid for at the time and one-half rate.

(Local #1010)

PLASTERER

Plasterer

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$40.78

Supplemental Benefit Rate per Hour: \$26.80

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$40.78

Supplemental Benefit Rate per Hour: \$27.55

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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.

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

Martin Luther King Jr. 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

When it is not possible to conduct alteration work during regular work hours, in a building occupied by tenants, said work shall proceed on a shift basis: however work over seven (7) hours in any twenty-four (24) hour period, the time after seven (7) hours shall be considered overtime.

The second shift shall start at a time between 3:30 p.m. and 7:00 p.m. and shall consist of seven (7) working hours and shall receive eight (8) hours of wages and benefits at the straight time rate. The workers on the second shift shall be allowed one-half (½) hour to eat with this time being included in the seven (7) hours of work.

(Local #530)

PLASTERER - TENDER

Plasterer - Tender

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: **\$34.24**

Supplemental Benefit Rate per Hour: **\$24.40**

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: **\$34.50**

Supplemental Benefit Rate per Hour: **\$25.14**

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$51.76

Supplemental Benefit Rate per Hour: \$37.19

Supplemental Note: Overtime supplemental benefit rate per hour: \$74.10

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$52.36

Supplemental Benefit Rate per Hour: \$37.34

Supplemental Note: Overtime supplemental benefit rate per hour: \$74.40

Overtime Description

Double time the regular rate after a 7 hour day - unless for new construction site work where the plumbing contract price is \$1 million or less, and for public works jobs where the plumbing contract is \$1.5 million or less, the hours of labor can be 8 hours per day at the employers option. On Alteration jobs when other mechanical

**OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE**

trades at the site are working an eighth hour at straight time, then the plumber shall also work an eighth hour at straight time.

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

Shift Rates

Shift work, when directly specified in public agency or authority documents where plumbing contract is \$8 million or less, will be permitted. 30% shift premium shall be paid for wages and fringe benefits for 4:00 pm and midnight shifts Monday to Friday. 50% shift premium shall be paid for wages and fringe benefits for 4:00 pm and midnight shift work performed on weekends. For shift work on holidays, double time wages and fringe benefits shall be paid.

(Plumbers Local #1)

PLUMBER (MECHANICAL EQUIPMENT AND SERVICE)

(Mechanical Equipment and Service work shall include any repair and/or replacement of the present plumbing system.)

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: **\$32.96**

Supplemental Benefit Rate per Hour: **\$15.93**

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: **\$33.21**

Supplemental Benefit Rate per Hour: **\$16.43**

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.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

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
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: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$36.69

Supplemental Benefit Rate per Hour: \$25.46

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$37.11

Supplemental Benefit Rate per Hour: \$25.56

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Shift Rates

30% shift premium shall be paid for wages and fringe benefits for 4:00 pm and midnight shifts Monday to Friday.
50% shift premium shall be paid for wages and fringe benefits for 4:00 pm and midnight shift work performed on weekends. For shift work on holidays, double time wages and fringe benefits shall be paid.

(Plumbers Local #1)

PLUMBER: PUMP & TANK (Installation and Maintenance)

Plumber - Pump & Tank

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$52.31**

Supplemental Benefit Rate per Hour: **\$31.56**

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

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 3:30 P.M.) is to be paid at time and one half the regular hourly rate

(Plumbers Local #1)

POINTER - WATERPROOFER, CAULKER MECHANIC (EXTERIOR BUILDING RENOVATION)

Pointer - Waterproofer, Caulker Mechanic

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$44.63**

Supplemental Benefit Rate per Hour: **\$23.10**

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 4:30 P.M.) is to be paid at time and one half the regular rate.

(Bricklayer District Council)

ROOFER

Roofer

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: **\$38.00**

Supplemental Benefit Rate per Hour: **\$27.07**

Effective Period: 1/1/2013 - 6/30/2013

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Wage Rate per Hour: **\$39.00**

Supplemental Benefit Rate per Hour: **\$27.37**

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

Presidential Election 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.

(Local #8)

SANDBLASTER - STEAMBLASTER
(Exterior Building Renovation)

Sandblaster / Steamblaster

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$44.63**

Supplemental Benefit Rate per Hour: **\$23.10**

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).

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

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 4:30 P.M.) is to be paid at time and one half the regular rate.

(Bricklayer District Council)

SHEET METAL WORKER

Sheet Metal Worker

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$45.65

Supplemental Benefit Rate per Hour: \$40.50

Supplemental Note: Supplemental benefit contributions are to be made at the applicable overtime rates.

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$45.65

Supplemental Benefit Rate per Hour: \$42.00

Supplemental Note: Supplemental benefit contributions are to be made at the applicable overtime rates.

Sheet Metal Worker - Duct Cleaner

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$12.90

Supplemental Benefit Rate per Hour: \$8.07

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: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$36.52

Supplemental Benefit Rate per Hour: \$40.50

**OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE**

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: **\$36.52**

Supplemental Benefit Rate per Hour: **\$42.00**

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

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 (seven 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. No journeyman engaged in fan maintenance shall work in excess of forty (40) hours in any work week.

(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.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$40.09

Supplemental Benefit Rate per Hour: \$22.06

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)

SIGN ERECTOR

(Sheet Metal, Plastic, Electric, and Neon)

Sign Erector

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$41.55

Supplemental Benefit Rate per Hour: \$39.32

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$42.80

Supplemental Benefit Rate per Hour: \$42.17

Overtime

Time and one half the regular rate after a 7 hour day.

Time and one half the regular rate for Saturday.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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
Washington's Birthday
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 I

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: **\$50.75**

Supplemental Benefit Rate per Hour: **\$49.68**

Supplemental Note: Overtime supplemental benefit rate: \$98.62

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: **\$51.25**

Supplemental Benefit Rate per Hour: **\$50.54**

Supplemental Note: Overtime supplemental benefit rate: \$100.34

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

Columbus Day
Veteran's Day
Thanksgiving Day
Day after Thanksgiving
Christmas Day

Paid Holidays

None

Shift Rates

Work performed between 3:30 P.M. and 7:00 A.M. and on Saturdays, Sundays and Holidays shall be at double time the regular hourly rate and paid at the overtime supplemental benefit rate above.

Steamfitter II

For heating, ventilation, air conditioning and mechanical public works contracts with a dollar value not to exceed \$15,000,000 and for fire protection/sprinkler public works contracts not to exceed \$1,500,000.

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$50.75

Supplemental Benefit Rate per Hour: \$49.68

Supplemental Note: Overtime supplemental benefit rate: \$98.62

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$51.25

Supplemental Benefit Rate per Hour: \$50.54

Supplemental Note: Overtime supplemental benefit rate: \$100.34

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

None

Shift Rates

May be performed outside of the regular workday except Saturday, Sunday and Holidays. A shift shall consist of eight working hours. All work performed in excess of eight hours shall be paid at double time. No shift shall commence after 7:00 P.M. on Friday or 7:00 P.M. the day before holidays. All work performed after 12:01 A.M. Saturday or 12:01 A.M. the day before a Holiday will be paid at double time. When shift work is performed the wage rate for regular time worked is a thirty percent premium together with fringe benefits.

On Transit Authority projects, where work is performed in the vicinity of tracks all shift work on weekends and holidays may be performed at the regular shift rates.

Local #638

STEAMFITTER - REFRIGERATION AND AIR CONDITIONER (Maintenance and Installation Service Person)

Refrigeration and Air Conditioner Mechanic

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$36.30

Supplemental Benefit Rate per Hour: \$11.76

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$37.05

Supplemental Benefit Rate per Hour: \$12.26

Refrigeration and Air Conditioner Service Person V (4th year)

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$29.82

Supplemental Benefit Rate per Hour: \$10.71

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$30.44

Supplemental Benefit Rate per Hour: \$11.13

Refrigeration and Air Conditioner Service Person IV (3rd year)

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$24.71

Supplemental Benefit Rate per Hour: \$9.80

Effective Period: 1/1/2013 - 6/30/2013

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Wage Rate per Hour: \$25.22

Supplemental Benefit Rate per Hour: \$10.16

Refrigeration and Air Conditioner Service Person III (2nd year)

Filter changing and maintenance thereof, oil and greasing, tower and coil cleaning, scraping and painting, general housekeeping, taking of water samples.

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$21.21

Supplemental Benefit Rate per Hour: \$9.12

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$21.65

Supplemental Benefit Rate per Hour: \$9.44

Refrigeration and Air Conditioner Service Person II (2nd six months)

Filter changing and maintenance thereof, oil and greasing, tower and coil cleaning, scraping and painting, general housekeeping, taking of water samples.

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$17.60

Supplemental Benefit Rate per Hour: \$8.50

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$17.96

Supplemental Benefit Rate per Hour: \$8.78

Refrigeration and Air Conditioner Service Person I (1st six months)

Filter changing and maintenance thereof, oil and greasing, tower and coil cleaning, scraping and painting, general housekeeping, taking of water samples.

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$10.95

Supplemental Benefit Rate per Hour: \$7.90

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$11.18

Supplemental Benefit Rate per Hour: \$8.10

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.

Overtime Holidays

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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 #638B)

STONE MASON - SETTER

Stone Mason - Setters

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$47.72

Supplemental Benefit Rate per Hour: \$35.28

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
Washington's Birthday
Good Friday
Memorial Day
Independence Day
Labor Day

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Thanksgiving Day
Christmas Day

Paid Holidays

1/2 day on Christmas Eve if work is performed in the A.M.

Shift Rates

For all work outside the regular workday (8:00 A.M. to 3:30 P.M. Monday through Friday), the pay shall be straight time plus a ten percent (10%) differential.

(Bricklayers District Council)

TAPER

Drywall Taper

Effective Period: 7/1/2012 - 12/25/2012

Wage Rate per Hour: **\$43.32**

Supplemental Benefit Rate per Hour: **\$21.66**

Effective Period: 12/26/2012 - 6/30/2013

Wage Rate per Hour: **\$43.82**

Supplemental Benefit Rate per Hour: **\$21.66**

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 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

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.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Shift Rates

Time and one half the regular rate outside the regular work hours (8:00 A.M. through 3:30 P.M.)

(Local #1974)

TELECOMMUNICATION WORKER
(Voice Installation Only)

Telecommunication Worker

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$35.94**

Supplemental Benefit Rate per Hour: **\$13.19**

Supplemental Note: The above rate applies for Manhattan, Bronx, Brooklyn, Queens. **\$12.64** for Staten Island only.

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 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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$38.17

Supplemental Benefit Rate per Hour: \$26.76

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$38.49

Supplemental Benefit Rate per Hour: \$27.42

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

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

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: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$47.75

Supplemental Benefit Rate per Hour: \$30.83

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$48.55

Supplemental Benefit Rate per Hour: \$31.46

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

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)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

TIMBERPERSON

Timberperson

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$42.63

Supplemental Benefit Rate per Hour: \$41.99

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 10:00 P.M., shall work eight and one half hours but will be paid for 9 hours, including benefits at the straight time rate for 8 hours.

(Local #1536)

TUNNEL WORKER

Blasters, Mucking Machine Operators (Compressed Air Rates)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$52.00

Supplemental Benefit Rate per Hour: \$46.85

Tunnel Workers (Compressed Air Rates)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate per Hour: \$50.19
Supplemental Benefit Rate per Hour: \$45.29

Top Nipper (Compressed Air Rates)

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate per Hour: \$49.27
Supplemental Benefit Rate per Hour: \$44.51

Outside Lock Tender, Outside Gauge Tender, Muck Lock Tender (Compressed Air Rates)

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate per Hour: \$48.37
Supplemental Benefit Rate per Hour: \$43.67

Bottom Bell & Top Bell Signal Person: Shaft Person (Compressed Air Rates)

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate per Hour: \$48.37
Supplemental Benefit Rate per Hour: \$43.67

Changehouse Attendant: Powder Watchperson (Compressed Air Rates)

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate per Hour: \$42.09
Supplemental Benefit Rate per Hour: \$41.41

Blasters (Free Air Rates)

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate per Hour: \$49.62
Supplemental Benefit Rate per Hour: \$44.75

Tunnel Workers (Free Air Rates)

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate per Hour: \$47.48
Supplemental Benefit Rate per Hour: \$42.84

All Others (Free Air Rates)

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate per Hour: \$43.87
Supplemental Benefit Rate per Hour: \$39.62

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 PREVAILING WAGE SCHEDULE

Microtunneling (Free Air Rates)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$37.98

Supplemental Benefit Rate per Hour: \$34.27

Overtime Description

For Repair-Maintenance Work on Existing Equipment and Facilities - Time and one half the regular rate after a 7 hour day, or for Saturday, or for Sunday. Double time the regular rate for work on a holiday.

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

Lincoln's Birthday

President's Day

Memorial Day

Independence Day

Labor Day

Columbus Day

Election Day

Veteran's Day

Thanksgiving Day

Christmas Day

(Local #147)

WELDER

**TO BE PAID AT THE RATE OF THE JOURNEYPERSON IN THE TRADE
PERFORMING THE WORK.**

THIS PAGE INTENTIONALLY LEFT BLANK

OFFICE OF THE COMPTROLLER

CITY OF NEW YORK

220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

APPENDIX

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 employed on a public work project.

Any employee listed on a payroll at an apprentice wage rate, who is not registered as above, shall be paid the journey person wage rate for the classification of work he 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.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

APPRENTICESHIP SCHEDULE OF PREVAILING WAGES AND SUPPLEMENTAL BENEFITS
ADDENDUM
EFFECTIVE PERIOD JANUARY 1, 2013 THROUGH JUNE 30, 2013

List of Amended Classifications

1. Boilermaker
2. House Wrecker
3. Iron Worker - Ornamental
4. Iron Worker - Structural
5. Mason Tender
6. Plasterer
7. Plumber

TABLE OF CONTENTS

<u>CLASSIFICATION</u>	<u>PAGE</u>
ASBESTOS HANDLER.....	4
BOILERMAKER.....	4
BRICKLAYER	6
CARPENTER	7
CEMENT MASON	8
CEMENT AND CONCRETE WORKER.....	8
DERRICKPERSON & RIGGER (STONE)	9
DOCKBUILDER/PILE DRIVER.....	10
ELECTRICIAN.....	10
ELEVATOR CONSTRUCTOR	12
ELEVATOR REPAIR & MAINTENANCE.....	13
ENGINEER.....	14
ENGINEER - OPERATING.....	14
FLOOR COVERER	15
GLAZIER.....	16
HEAT & FROST INSULATOR	16
HOUSE WRECKER.....	17
IRON WORKER - ORNAMENTAL	18
IRON WORKER - STRUCTURAL.....	20
LABORER (FOUNDATION, CONCRETE, EXCAVATING, STREET PIPE LAYER & COMMON)....	21
MARBLE MECHANICS.....	22
MASON TENDER.....	23
METALLIC LATHER	24
MILLWRIGHT	25
PAVER AND ROADBUILDER	26
PAINTER.....	26
PAINTER - STRUCTURAL STEEL.....	27
PLASTERER.....	28
PLUMBER.....	29
POINTER - WATERPROOFER, CAULKER MECHANIC (EXTERIOR BUILDING RENOVATION) ..	30
ROOFER	31
SHEET METAL WORKER	32
SIGN ERECTOR	33
STEAMFITTER.....	34
STONE MASON - SETTER.....	35
TAPER.....	36
TILE LAYER - SETTER.....	36
TIMBERPERSON.....	37

ASBESTOS HANDLER

(Ratio of Apprentice Journeyperson: 1 to 1, 1 to 3)

Asbestos Handler (First 1000 Hours)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 78% of Journeyperson's rate

Supplemental Benefit Rate Per Hour: \$14.85

Asbestos Handler (Second 1000 Hours)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 80% of Journeyperson's rate

Supplemental Benefit Rate Per Hour: \$14.85

Asbestos Handler (Third 1000 Hours)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 83% of Journeyperson's rate

Supplemental Benefit Rate Per Hour: \$14.85

Asbestos Handler (Fourth 1000 Hours)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 89% of Journeyperson's rate

Supplemental Benefit Rate Per Hour: \$14.85

(Local #78)

BOILERMAKER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Boilermaker (First Year)

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate Per Hour: 65% of Journeyperson's rate

Supplemental Benefit Rate Per Hour: \$27.41

Effective Period: 1/1/2013 - 3/31/2013

Wage Rate Per Hour: 65% of Journeyperson's rate

Supplemental Benefit Rate Per Hour: \$28.45

Effective Period: 4/1/2013 - 6/30/2013

Wage Rate Per Hour: 65% of Journeyperson's rate

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Supplemental Benefit Rate Per Hour: \$28.75

Boilermaker (Second Year: 1st Six Months)

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate Per Hour: 70% of Journeyman's rate

Supplemental Benefit Rate Per Hour: \$28.91

Effective Period: 1/1/2013 - 3/31/2013

Wage Rate Per Hour: 70% of Journeyman's rate

Supplemental Benefit Rate Per Hour: \$30.03

Effective Period: 4/1/2013 - 6/30/2013

Wage Rate Per Hour: 70% of Journeyman's rate

Supplemental Benefit Rate Per Hour: \$30.33

Boilermaker (Second Year: 2nd Six Months)

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate Per Hour: 75% of Journeyman's rate

Supplemental Benefit Rate Per Hour: \$30.40

Effective Period: 1/1/2013 - 3/31/2013

Wage Rate Per Hour: 75% of Journeyman's rate

Supplemental Benefit Rate Per Hour: \$31.61

Effective Period: 4/1/2013 - 6/30/2013

Wage Rate Per Hour: 75% of Journeyman's rate

Supplemental Benefit Rate Per Hour: \$31.91

Boilermaker (Third Year: 1st Six Months)

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate Per Hour: 80% of Journeyman's rate

Supplemental Benefit Rate Per Hour: \$31.89

Effective Period: 1/1/2013 - 3/31/2013

Wage Rate Per Hour: 80% of Journeyman's rate

Supplemental Benefit Rate Per Hour: \$33.19

Effective Period: 4/1/2013 - 6/30/2013

Wage Rate Per Hour: 80% of Journeyman's rate

Supplemental Benefit Rate Per Hour: \$33.49

Boilermaker (Third Year: 2nd Six Months)

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate Per Hour: 85% of Journeyman's rate

Supplemental Benefit Rate Per Hour: \$33.38

Effective Period: 1/1/2013 - 3/31/2013

Wage Rate Per Hour: 85% of Journeyman's rate

Supplemental Benefit Rate Per Hour: \$34.76

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Effective Period: 4/1/2013 - 6/30/2013
Wage Rate Per Hour: 85% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$35.06

Boilermaker (Fourth Year: 1st Six Months)

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate Per Hour: 90% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$34.88

Effective Period: 1/1/2013 - 3/31/2013
Wage Rate Per Hour: 90% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$36.34

Effective Period: 4/1/2013 - 6/30/2013
Wage Rate Per Hour: 90% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$36.64

Boilermaker (Fourth Year: 2nd Six Months)

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate Per Hour: 95% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$36.38

Effective Period: 1/1/2013 - 3/31/2013
Wage Rate Per Hour: 95% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$37.90

Effective Period: 4/1/2013 - 6/30/2013
Wage Rate Per Hour: 95% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$38.20

(Local #5)

BRICKLAYER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Bricklayer (First 750 Hours)

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$16.60

Bricklayer (Second 750 Hours)

Effective Period: 7/1/2012 - 6/30/2013

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Wage Rate Per Hour: 60% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$16.60

Bricklayer (Third 750 Hours)

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 70% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$16.60

Bricklayer (Fourth 750 Hours)

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 80% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$16.60

Bricklayer (Fifth 750 Hours)

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 90% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$16.60

Bricklayer (Sixth 750 Hours)

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 95% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$16.60

(Bricklayer District Council)

CARPENTER
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Carpenter (First Year)

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 40% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$27.69

Carpenter (Second Year)

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$27.69

Carpenter (Third Year)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 65% of Journey person's rate
Supplemental Benefit Rate Per Hour: \$27.69

Carpenter (Fourth Year)

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 80% of Journey person's rate
Supplemental Benefit Rate Per Hour: \$27.69

(Carpenters District Council)

CEMENT MASON
(Ratio of Apprentice to Journey person: 1 to 1, 1 to 4)

Cement Mason (First Year)

Effective Period: 7/1/2012 - 6/30/2013
Wage and Supplemental Rate Per Hour: 50% of Journey person's Rate

Cement Mason (Second Year)

Effective Period: 7/1/2012 - 6/30/2013
Wage and Supplemental Rate Per Hour: 60% of Journey person's Rate

Cement Mason (Third Year)

Effective Period: 7/1/2012 - 6/30/2013
Wage and Supplemental Rate Per Hour: 70% of Journey person's Rate

(Local #780)

CEMENT AND CONCRETE WORKER
(Ratio of Apprentice to Journey person: 1 to 1, 1 to 3)

Cement & Concrete Worker (0 - 500 hours)

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 50% of Journey person's rate
Supplemental Benefit Rate Per Hour: \$17.54

Cement & Concrete Worker (501 - 1000 hours)

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$18.37

Cement & Concrete Worker (1001 - 2000 hours)

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$23.75

Cement & Concrete Worker (2001 - 4000 hours)

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 80% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: \$24.57

(Cement Concrete Workers District Council)

DERRICKPERSON & RIGGER (STONE)
(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 6)

Derrickperson & Rigger (stone) - First Year

Effective Period: 7/1/2012 - 6/30/2013
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: 7/1/2012 - 6/30/2013
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: 7/1/2012 - 6/30/2013
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: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 90% of Journeyperson's rate
Supplemental Benefit Rate Per Hour: 75% of Journeyperson's rate

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

(Local #197)

DOCKBUILDER/PILE DRIVER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 6)

Dockbuilder/Pile Driver (First Year)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 40% of Journeyperson's rate

Supplemental Benefit Rate Per Hour: \$27.69

Dockbuilder/Pile Driver (Second Year)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 50% of Journeyperson's rate

Supplemental Benefit Rate Per Hour: \$27.69

Dockbuilder/Pile Driver (Third Year)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 65% of Journeyperson's rate

Supplemental Benefit Rate Per Hour: \$27.69

Dockbuilder/Pile Driver (Fourth Year)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 80% of Journeyperson's rate

Supplemental Benefit Rate Per Hour: \$27.69

(Carpenters District Council)

ELECTRICIAN

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Electrician (First Year - Hired before 5/10/07)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$14.25

Supplemental Benefit Rate per Hour: \$11.19

Overtime Wage Rate Per Hour: \$21.38

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Overtime Supplemental Rate Per Hour: \$11.96

Electrician (First Year - Hired on or After 5/10/07)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$11.50

Supplemental Benefit Rate per Hour: \$9.86

Overtime Wage Rate Per Hour: \$17.25

Overtime Supplemental Rate Per Hour: \$10.48

Electrician (Second Year - Hired before 5/10/07)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$17.05

Supplemental Benefit Rate per Hour: \$12.54

Overtime Wage Rate Per Hour: \$25.58

Overtime Supplemental Rate Per Hour: \$13.47

Electrician (Second Year - Hired on or After 5/10/07)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$13.50

Supplemental Benefit Rate per Hour: \$10.83

Overtime Wage Rate Per Hour: \$20.25

Overtime Supplemental Rate Per Hour: \$11.56

Electrician (Third Year - Hired before 5/10/07)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$19.15

Supplemental Benefit Rate per Hour: \$13.56

Overtime Wage Rate Per Hour: \$28.73

Overtime Supplemental Rate Per Hour: \$14.60

Electrician (Third Year - Hired on or After 5/10/07)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$15.50

Supplemental Benefit Rate per Hour: \$11.79

Overtime Wage Rate Per Hour: \$23.25

Overtime Supplemental Rate Per Hour: \$12.63

Electrician (Fourth Year - Hired before 5/10/07)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$21.10

Supplemental Benefit Rate per Hour: \$14.50

Overtime Wage Rate Per Hour: \$31.65

Overtime Supplemental Rate Per Hour: \$15.65

Electrician (Fourth Year - Hired on or After 5/10/07)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$17.50

Supplemental Benefit Rate per Hour: \$12.76

Overtime Wage Rate Per Hour: \$26.25

Overtime Supplemental Rate Per Hour: \$13.71

Electrician (Fifth Year - Hired before 5/10/07)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$25.30

Supplemental Benefit Rate per Hour: \$17.52

Overtime Wage Rate Per Hour: \$37.95

Overtime Supplemental Rate Per Hour: \$18.85

Electrician (Fifth Year - Hired on or After 5/10/07)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$21.50

Supplemental Benefit Rate per Hour: \$15.71

Overtime Wage Rate Per Hour: \$32.25

Overtime Supplemental Rate Per Hour: \$16.84

Overtime Description

For "A" rated Apprentices (work in excess of 7 hours per day)

For "M" rated Apprentices (work in excess of 8 hours per day)

(Local #3)

ELEVATOR CONSTRUCTOR

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 2)

Elevator (Constructor) - First Year

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 50% of Journeyperson's rate

Supplemental Rate Per Hour: \$25.40

Effective 3/17/2013 - Supplemental Rate Per Hour: \$26.87

Elevator (Constructor) - Second Year

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 55% of Journeyperson's rate

Supplemental Rate Per Hour: \$26.43

Effective 3/17/2013 - Supplemental Rate Per Hour: \$27.92

Elevator (Constructor) - Third Year

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Rate Per Hour: \$27.84
Effective 3/17/2013 - Supplemental Rate Per Hour: \$29.38

Elevator (Constructor) - Fourth Year

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Rate Per Hour: \$29.25
Effective 3/17/2013 - Supplemental Benefit Per Hour: \$30.84

(Local #1)

ELEVATOR REPAIR & MAINTENANCE

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 2)

Elevator Service/Modernization Mechanic (First Year)

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Benefit Per Hour: \$25.33
Effective 3/17/2013 - Supplemental Benefit Per Hour: \$26.79

Elevator Service/Modernization Mechanic (Second Year)

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Benefit Per Hour: \$25.65
Effective 3/17/2013 - Supplemental Benefit Per Hour: \$27.12

Elevator Service/Modernization Mechanic (Third Year)

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 65% of Journeyperson's rate
Supplemental Benefit Per Hour: \$26.92
Effective 3/17/2013 - Supplemental Benefit Per Hour: \$28.43

Elevator Service/Modernization Mechanic (Fourth Year)

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 75% of Journeyperson's rate
Supplemental Benefit Per Hour: \$28.19

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Effective 3/17/2013 - Supplemental Benefit Per Hour: \$29.74

(Local #1)

ENGINEER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 5)

Engineer - First Year

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$21.64

Supplemental Benefit Rate per Hour: \$20.07

Engineer - Second Year

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$27.05

Supplemental Benefit Rate per Hour: \$20.07

Engineer - Third Year

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$29.75

Supplemental Benefit Rate per Hour: \$20.07

Engineer - Fourth Year

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$32.45

Supplemental Benefit Rate per Hour: \$20.07

(Local #15)

ENGINEER - OPERATING

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 5)

Operating Engineer - First Year

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour 40% of Journeyperson's Rate

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Supplemental Benefit Per Hour: \$18.65

Operating Engineer - Second Year

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 50% of Journeyperson's Rate

Supplemental Benefit Per Hour: \$18.65

Operating Engineer - Third Year

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 60% of Journeyperson's Rate

Supplemental Benefit Per Hour: \$18.65

(Local #14)

FLOOR COVERER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Floor Coverer (First Year)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 40% of Journeyperson's rate

Supplemental Rate Per Hour: \$25.75

Floor Coverer (Second Year)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 50% of Journeyperson's rate

Supplemental Rate Per Hour: \$25.75

Floor Coverer (Third Year)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 65% of Journeyperson's rate

Supplemental Rate Per Hour: \$25.75

Floor Coverer (Fourth Year)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 80% of Journeyperson's rate

Supplemental Rate Per Hour: \$25.75

(Carpenters District Council)

GLAZIER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Glazier (First Year)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 40% of Journeyperson's rate

Supplemental Rate Per Hour: \$11.97

Glazier (Second Year)

Effective Period: 7/1/2012 - 10/31/2012

Wage Rate Per Hour: 50% of Journeyperson's rate

Supplemental Rate Per Hour: \$21.01

Effective Period: 11/1/2012 - 6/30/2013

Wage Rate Per Hour: 50% of Journeyperson's rate

Supplemental Rate Per Hour: \$21.13

Glazier (Third Year)

Effective Period: 7/1/2012 - 10/31/2012

Wage Rate Per Hour: 60% of Journeyperson's rate

Supplemental Rate Per Hour: \$23.38

Effective Period: 11/1/2012 - 6/30/2013

Wage Rate Per Hour: 50% of Journeyperson's rate

Supplemental Rate Per Hour: \$23.54

Glazier (Fourth Year)

Effective Period: 7/1/2012 - 10/31/2012

Wage Rate Per Hour: 80% of Journeyperson's rate

Supplemental Rate Per Hour: \$28.14

Effective Period: 11/1/2012 - 6/30/2013

Wage Rate Per Hour: 50% of Journeyperson's rate

Supplemental Rate Per Hour: \$28.34

(Local #1281)

HEAT & FROST INSULATOR

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Heat & Frost Insulator (First Year)

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 40% of Journeyperson's rate

Heat & Frost Insulator (Second Year)

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 60% of Journeyperson's rate

Heat & Frost Insulator (Third Year)

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 70% of Journeyperson's rate

Heat & Frost Insulator (Fourth Year)

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 80% 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: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$20.06

Supplemental Benefit Rate per Hour: \$15.45

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$20.21

Supplemental Benefit Rate per Hour: \$15.80

House Wrecker - Second Year

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$21.06

Supplemental Benefit Rate per Hour: \$15.45

Effective Period: 1/1/2013 - 6/30/2013

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Wage Rate per Hour: \$21.26
Supplemental Benefit Rate per Hour: \$15.80

House Wrecker - Third Year

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate per Hour: \$22.56
Supplemental Benefit Rate per Hour: \$15.45

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate per Hour: \$22.81
Supplemental Benefit Rate per Hour: \$15.80

House Wrecker - Fourth Year

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate per Hour: \$25.06
Supplemental Benefit Rate per Hour: \$15.45

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate per Hour: \$25.36
Supplemental Benefit Rate per Hour: \$15.80

(Local #79)

IRON WORKER - ORNAMENTAL
(Ratio of Apprentice to Journeyman: 1 to 1, 1 to 4)

Iron Worker (Ornamental) - 1st Four Months - Hired on or Before 8/1/08

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 60% of Journeyman's rate
Supplemental Rate Per Hour: \$32.06

Iron Worker (Ornamental) 5 - 10 Months - Hired on or Before 8/1/08

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 65% of Journeyman's rate
Supplemental Rate Per Hour: \$32.89

Iron Worker (Ornamental) 11 - 16 Months - Hired on or Before 8/1/08

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate Per Hour: 70% of Journeyman's rate
Supplemental Rate Per Hour: \$33.73

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate Per Hour: 70% of Journeyperson's rate
Supplemental Rate Per Hour: \$34.34

Iron Worker (Ornamental) 17 - 22 Months - Hired on or Before 8/1/08

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 80% of Journeyperson's rate
Supplemental Rate Per Hour: \$35.39

Iron Worker (Ornamental) 23 - 28 Months - Hired on or Before 8/1/08

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 85% of Journeyperson's rate
Supplemental Rate Per Hour: \$36.22

Iron Worker (Ornamental) 29 - 36 Months - Hired on or Before 8/1/08

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 95% of Journeyperson's rate
Supplemental Rate Per Hour: \$37.89

Iron Worker (Ornamental) - 1st Ten Months - Hired After 8/1/08

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Rate Per Hour: \$30.40

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Rate Per Hour: \$33.39

Iron Worker (Ornamental) - 11 - 16 Months - Hired After 8/1/08

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Rate Per Hour: \$31.23

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Rate Per Hour: \$34.34

Iron Worker (Ornamental) - 17 - 22 Months - Hired After 8/1/08

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate Per Hour: 60% of Journeyperson's rate
Supplemental Rate Per Hour: \$32.06

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate Per Hour: 60% of Journeyperson's rate
Supplemental Rate Per Hour: \$35.29

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Iron Worker (Ornamental) - 23 - 28 Months - Hired After 8/1/08

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate Per Hour: 70% of Journeyperson's rate
Supplemental Rate Per Hour: \$33.73

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate Per Hour: 70% of Journeyperson's rate
Supplemental Rate Per Hour: \$37.19

Iron Worker (Ornamental) - 29 - 36 Months - Hired After 8/1/08

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate Per Hour: 80% of Journeyperson's rate
Supplemental Rate Per Hour: \$35.39

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate Per Hour: 80% of Journeyperson's rate
Supplemental Rate Per Hour: \$39.09

(Local #580)

IRON WORKER - STRUCTURAL

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 6)

Iron Worker (Structural) - 1st Six Months

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate per Hour: \$23.62
Supplemental Benefit Rate per Hour: \$41.21

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate per Hour: \$24.10
Supplemental Benefit Rate per Hour: \$43.12

Iron Worker (Structural) - 7- 18 Months

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate per Hour: \$24.22
Supplemental Benefit Rate per Hour: \$41.21

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate per Hour: \$24.70
Supplemental Benefit Rate per Hour: \$43.12

Iron Worker (Structural) - 19 - 36 months

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$24.82

Supplemental Benefit Rate per Hour: \$41.21

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$25.30

Supplemental Benefit Rate per Hour: \$43.12

(Local #40 and #361)

LABORER (FOUNDATION, CONCRETE, EXCAVATING, STREET PIPE LAYER & COMMON)

(Ratio Apprentice to Journeyperson: 1 to 1, 1 to 3)

Laborer (Foundation, Concrete, Excavating, Street Pipe Layer & Common) - First 1000 hours

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 50% of Journeyperson's rate

Supplemental Rate Per Hour: \$31.75

Laborer (Foundation, Concrete, Excavating, Street Pipe Layer & Common) - Second 1000 hours

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 60% of Journeyperson's rate

Supplemental Rate Per Hour: \$31.75

Laborer (Foundation, Concrete, Excavating, Street Pipe Layer & Common) - Third 1000 hours

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 75% of Journeyperson's rate

Supplemental Rate Per Hour: \$31.75

Laborer (Foundation, Concrete, Excavating, Street Pipe Layer & Common) - Fourth 1000 hours

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 90% of Journeyperson's rate

Supplemental Rate Per Hour: \$31.75

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

(Local #731)

MARBLE MECHANICS

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Cutters & Setters - First 750 Hours

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 50% of Journeyperson's rate

NO BENEFITS PAID DURING THE FIRST TWO MONTHS (PROBATIONARY PERIOD)

Cutters & Setters - Second 750 Hours

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 55% of Journeyperson's rate

Cutters & Setters - Third 750 Hours

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 65% of Journeyperson's rate

Cutters & Setters - Fourth 750 Hours

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 75% of Journeyperson's rate

Cutters & Setters - Fifth 750 Hours

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 85% of Journeyperson's rate

Cutters & Setters - Sixth 750 Hours

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 95% of Journeyperson's rate

Polishers & Finishers - First 750 Hours

Effective Period: 7/1/2012 - 6/30/2013

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: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 60% of Journeyperson's rate

Polishers & Finishers - Third 750 Hours

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 75% of Journeyperson's rate

Polishers & Finishers - Fourth 750 Hours

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 90% 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: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$20.33

Supplemental Benefit Rate per Hour: \$16.16

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$20.48

Supplemental Benefit Rate per Hour: \$16.51

Mason Tender - Second Year

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$21.33

Supplemental Benefit Rate per Hour: \$16.16

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$21.53

Supplemental Benefit Rate per Hour: \$16.51

Mason Tender - Third Year

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$22.83

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Supplemental Benefit Rate per Hour: \$16.16

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$23.08

Supplemental Benefit Rate per Hour: \$16.51

Mason Tender - Fourth Year

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$25.33

Supplemental Benefit Rate per Hour: \$16.16

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$25.63

Supplemental Benefit Rate per Hour: \$16.51

(Local #79)

METALLIC LATHER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Metallic Lather (First Year -Called Prior to 6/29/11)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$27.91

Supplemental Benefit Rate per Hour: \$22.79

Metallic Lather (Second Year - Called Prior to 6/29/11)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$32.51

Supplemental Benefit Rate per Hour: \$24.44

Metallic Lather (Third Year - Called Prior to 6/29/11)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$37.57

Supplemental Benefit Rate per Hour: \$25.59

Metallic Lather (First Year -Called On Or After 6/29/11)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$17.71

Supplemental Benefit Rate per Hour: \$19.85

Metallic Lather (Second Year - Called On Or After 6/29/11)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$22.71

Supplemental Benefit Rate per Hour: \$19.85

Metallic Lather (Third Year - Called On Or After 6/29/11)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$27.71

Supplemental Benefit Rate per Hour: \$19.85

(Local #46)

MILLWRIGHT

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Millwright (First Year)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$25.40

Supplemental Benefit Rate per Hour: \$28.67

Millwright (Second Year)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$30.02

Supplemental Benefit Rate per Hour: \$31.87

Millwright (Third Year)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$34.64

Supplemental Benefit Rate per Hour: \$36.19

Millwright (Fourth Year)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$43.88

Supplemental Benefit Rate per Hour: \$41.50

(Local #740)

PAVER AND ROADBUILDER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Paver and Roadbuilder - First Year (Minimum 1000 hours)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$25.72**

Supplemental Benefit Rate per Hour: **\$15.75**

Paver and Roadbuilder - Second Year (Minimum 1000 hours)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$27.29**

Supplemental Benefit Rate per Hour: **\$15.75**

(Local #1010)

PAINTER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Painter - Brush & Roller - First Year

Effective Period: 7/1/2012 - 10/31/2012

Wage Rate per Hour: **\$14.20**

Supplemental Benefit Rate per Hour: **\$10.88**

Effective Period: 11/1/2012 - 6/30/2013

Wage Rate per Hour: **\$14.40**

Supplemental Benefit Rate per Hour: **\$10.88**

Painter - Brush & Roller - Second Year

Effective Period: 7/1/2012 - 10/31/2012

Wage Rate per Hour: **\$17.75**

Supplemental Benefit Rate per Hour: **\$14.73**

Effective Period: 11/1/2012 - 6/30/2013

Wage Rate per Hour: **\$18.00**

Supplemental Benefit Rate per Hour: **\$14.73**

Painter - Brush & Roller - Third Year

Effective Period: 7/1/2012 - 10/31/2012

Wage Rate per Hour: \$21.30

Supplemental Benefit Rate per Hour: \$17.64

Effective Period: 11/1/2012 - 6/30/2013

Wage Rate per Hour: \$21.60

Supplemental Benefit Rate per Hour: \$17.64

Painter - Brush & Roller - Fourth Year

Effective Period: 7/1/2012 - 10/31/2012

Wage Rate per Hour: \$28.40

Supplemental Benefit Rate per Hour: \$23.02

Effective Period: 11/1/2012 - 6/30/2013

Wage Rate per Hour: \$28.80

Supplemental Benefit Rate per Hour: \$23.02

(District Council of Painters)

PAINTER - STRUCTURAL STEEL

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Painters - Structural Steel (First Year)

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 40% of Journeyperson's rate

Painters - Structural Steel (Second Year)

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 60% of Journeyperson's rate

Painters - Structural Steel (Third Year)

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 80% of Journeyperson's rate

(Local #806)

PLASTERER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Plasterer - First Year: 1st Six Months

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate Per Hour: 40% of Journeyperson's rate
Supplemental Rate Per Hour: \$14.61

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate Per Hour: 40% of Journeyperson's rate
Supplemental Rate Per Hour: \$15.36

Plasterer - First Year: 2nd Six Months

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate Per Hour: 45% of Journeyperson's rate
Supplemental Rate Per Hour: \$15.09

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate Per Hour: 45% of Journeyperson's rate
Supplemental Rate Per Hour: \$15.84

Plasterer - Second Year: 1st Six Months

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Rate Per Hour: \$17.06

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Rate Per Hour: \$17.81

Plasterer - Second Year: 2nd Six Months

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate Per Hour: 60% of Journeyperson's rate
Supplemental Rate Per Hour: \$18.14

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate Per Hour: 60% of Journeyperson's rate
Supplemental Rate Per Hour: \$18.89

Plasterer - Third Year: 1st Six Months

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate Per Hour: 70% of Journeyperson's rate
Supplemental Rate Per Hour: \$20.31

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate Per Hour: 70% of Journey person's rate
Supplemental Rate Per Hour: \$21.06

Plasterer - Third Year: 2nd Six Months

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate Per Hour: 75% of Journey person's rate
Supplemental Rate Per Hour: \$21.39

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate Per Hour: 75% of Journey person's rate
Supplemental Rate Per Hour: \$22.14

(Local #530)

PLUMBER

(Ratio of Apprentice to Journey person: 1 to 1, 1 to 3)

Plumber - First Year: 1st Six Months

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate per Hour: \$14.00
Supplemental Benefit Rate per Hour: \$0.71

Plumber - First Year: 2nd Six Months

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate per Hour: \$14.00
Supplemental Benefit Rate per Hour: \$2.96

Plumber - Second Year

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate per Hour: \$17.96
Supplemental Benefit Rate per Hour: \$16.25

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate per Hour: \$18.26
Supplemental Benefit Rate per Hour: \$16.32

Plumber - Third Year

Effective Period: 7/1/2012 - 12/31/2012

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Wage Rate per Hour: \$20.06
Supplemental Benefit Rate per Hour: \$16.25

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate per Hour: \$20.36
Supplemental Benefit Rate per Hour: \$16.32

Plumber - Fourth Year

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate per Hour: \$22.91
Supplemental Benefit Rate per Hour: \$16.25

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate per Hour: \$23.21
Supplemental Benefit Rate per Hour: \$16.32

Plumber - Fifth Year: 1st Six Months

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate per Hour: \$24.31
Supplemental Benefit Rate per Hour: \$16.25

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate per Hour: \$24.61
Supplemental Benefit Rate per Hour: \$16.32

Plumber - Fifth Year: 2nd Six Months

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate per Hour: \$36.38
Supplemental Benefit Rate per Hour: \$16.25

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate per Hour: \$36.68
Supplemental Benefit Rate per Hour: \$16.32

(Plumbers Local #1)

**POINTER - WATERPROOFER, CAULKER MECHANIC (EXTERIOR BUILDING
RENOVATION)**

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Pointer - Waterproofer, Caulker Mechanic - First Year

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$25.00

Supplemental Benefit Rate per Hour: \$3.45

Pointer - Waterproofer, Caulker Mechanic - Second Year

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$27.25

Supplemental Benefit Rate per Hour: \$8.40

Pointer - Waterproofer, Caulker Mechanic - Third Year

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$32.23

Supplemental Benefit Rate per Hour: \$11.15

Pointer - Waterproofer, Caulker Mechanic - Fourth Year

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$38.66

Supplemental Benefit Rate per Hour: \$11.15

(Bricklayer District Council)

ROOFER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 2)

Roofer - First Year

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 35% of Journeyperson's Rate

Roofer - Second Year

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 50% of Journeyperson's Rate

Roofer - Third Year

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 60% of Journeyperson's Rate

Roofer - Fourth Year

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 75% of Journeyperson's Rate

(Local #8)

SHEET METAL WORKER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 3)

Sheet Metal Worker - First Year

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 30% of Journeyperson's rate

Supplemental Rate Per Hour: \$15.37

Sheet Metal Worker - Second Year

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 35% of Journeyperson's rate

Supplemental Rate Per Hour: \$18.24

Sheet Metal Worker - Third Year (1st Six Months)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 40% of Journeyperson's rate

Supplemental Rate Per Hour: \$20.06

Sheet Metal Worker - Third Year (2nd Six Months)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 45% of Journeyperson's rate

Supplemental Rate Per Hour: \$21.87

Sheet Metal Worker - Fourth Year (1st Six Months)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 50% of Journeyperson's rate

Supplemental Rate Per Hour: \$23.69

Sheet Metal Worker - Fourth Year (2nd Six Months)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 55% of Journeyperson's rate

Supplemental Rate Per Hour: \$25.33

Sheet Metal Worker - Fifth Year (1st Six Months)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 60% of Journeyperson's rate
Supplemental Rate Per Hour: \$27.47

Sheet Metal Worker - Fifth Year(2nd Six Months)

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 70% of Journeyperson's rate
Supplemental Rate Per Hour: \$31.23

(Local #28)

SIGN ERECTOR

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Sign Erector - First Year: 1st Six Months

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 35% of Journeyperson's rate
Supplemental Rate Per Hour: \$5.96

Sign Erector - First Year: 2nd Six Months

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 40% of Journeyperson's rate
Supplemental Rate Per Hour: \$6.75

Sign Erector - Second Year: 1st Six Months

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 45% of Journeyperson's rate
Supplemental Rate Per Hour: \$7.55

Sign Erector - Second Year: 2nd Six Months

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 50% of Journeyperson's rate
Supplemental Rate Per Hour: \$8.34

Sign Erector - Third Year: 1st Six Months

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 55% of Journeyperson's rate
Supplemental Rate Per Hour: \$9.13

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Sign Erector - Third Year: 2nd Six Months

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 60% of Journeyman's rate
Supplemental Rate Per Hour: \$9.92

Sign Erector - Fourth Year: 1st Six Months

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 65% of Journeyman's rate
Supplemental Rate Per Hour: \$10.72

Sign Erector - Fourth Year: 2nd Six Months

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 70% of Journeyman's rate
Supplemental Rate Per Hour: \$11.51

Sign Erector - Fifth Year

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 75% of Journeyman's rate
Supplemental Rate Per Hour: \$12.30

Sign Erector - Sixth Year

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate Per Hour: 80% of Journeyman's rate
Supplemental Rate Per Hour: \$12.30

(Local #137)

STEAMFITTER

(Ratio of Apprentice to Journeyman: 1 to 1, 1 to 3)

Steamfitter - First Year

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate and Supplemental Per Hour: 40% of Journeyman's rate

Steamfitter - Second Year

Effective Period: 7/1/2012 - 6/30/2013
Wage Rate and Supplemental Rate Per Hour: 50% of Journeyman's rate.

Steamfitter - Third Year

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate and Supplemental Rate per Hour: 65% of Journeyperson's rate.

Steamfitter - Fourth Year

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate and Supplemental Rate Per Hour: 80% of Journeyperson's rate.

Steamfitter - Fifth Year

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate and Supplemental Rate Per Hour: 85% of Journeyperson's rate.

(Local #638)

STONE MASON - SETTER

(Ratio Apprentice of Journeyperson: 1 to 1, 1 to 2)

Stone Mason - Setters - First 750 Hours

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 50% of Journeyperson's rate

Stone Mason - Setters - Second 750 Hours

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 60% of Journeyperson's rate

Supplemental Rate Per Hour: 50% of Journeyperson's rate

Stone Mason - Setters - Third 750 Hours

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 70% of Journeyperson's rate

Supplemental Rate Per Hour: 50% of Journeyperson's rate

Stone Mason - Setters - Fourth 750 Hours

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 80% of Journeyperson's rate

Supplemental Rate Per Hour: 50% of Journeyperson's rate

Stone Mason - Setters - Fifth 750 Hours

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 90% of Journeyperson's rate

Supplemental Rate Per Hour: 50% of Journeyperson's rate

Stone Mason - Setters - Sixth 750 Hours

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 100% of Journeyperson's rate

Supplemental Rate Per Hour: 50% 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: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 40% of Journeyperson's rate

Drywall Taper - Second Year

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 60% of Journeyperson's rate

Drywall Taper - Third Year

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 80% of Journeyperson's rate

(Local #1974)

TILE LAYER - SETTER

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 4)

Tile Layer - Setter - First 750 Hours

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 50% of Journeyperson's rate

Tile Layer - Setter - Second 750 Hours

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 55% of Journeyperson's rate

Tile Layer - Setter - Third 750 Hours

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 65% of Journeyperson's rate

Tile Layer - Setter - Fourth 750 Hours

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 75% of Journeyperson's rate

Tile Layer - Setter - Fifth 750 Hours

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 85% of Journeyperson's rate

Tile Layer - Setter - Sixth 750 Hours

Effective Period: 7/1/2012 - 6/30/2013

Wage and Supplemental Rate Per Hour: 95% of Journeyperson's rate

(Local #7)

TIMBERPERSON

(Ratio of Apprentice to Journeyperson: 1 to 1, 1 to 6)

Timberperson - First Year

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 40% of Journeyperson's rate

Supplemental Rate Per Hour: \$27.49

Timberperson - Second Year

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 50% of Journeyperson's rate

Supplemental Rate Per Hour: \$27.49

Timberperson - Third Year

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 65% of Journeyperson's rate

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$220 APPRENTICESHIP PREVAILING WAGE SCHEDULE

Supplemental Rate Per Hour: \$27.49

Timberperson - Fourth Year

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate Per Hour: 80% of Journeyperson's rate

Supplemental Rate Per Hour: \$27.49

(Local #1536)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

LABOR LAW § 230 AND NYC ADMINISTRATIVE CODE § 6-130
BUILDING SERVICE EMPLOYEES

PREVAILING WAGE FOR BUILDING SERVICE EMPLOYEES ON NYC CONTRACTS PURSUANT TO
LABOR LAW § 230 ET SEQ.

Building service employees on public contracts must receive not less than the prevailing rate of wage and supplements for the classification of work performed. In accordance with Labor Law §230 et seq. the Comptroller of the City of New York has promulgated this schedule of prevailing wages and supplemental benefits for building service employees engaged on New York City public building service contracts in excess of \$1,500.00. Prevailing rates are required to be annexed to and form part of the contract pursuant to §231 (4).

Contracting agencies that anticipate doing work that may require building service trades or classifications not included in this schedule may request the Comptroller to establish a proper classification and wage determination for the work. Contractors using trades and/or classifications for which the Comptroller has not promulgated wages and benefits do so at their own risk.

Contractors are advised to review the applicable Comptroller's Prevailing Wage Schedule before bidding on public work. Any Prevailing Wage Rate error made by the Contracting Agency, whether in a contract document or other communication, will not preclude a finding against the contractor of a prevailing-wage violation.

PREVAILING WAGE FOR BUILDING SERVICE EMPLOYEES IN NEW YORK CITY LEASED OR
FINANCIALLY ASSISTED FACILITIES PURSUANT TO NYC ADMINISTRATIVE CODE § 6-130

Covered landlords & covered financial assistance recipients shall ensure that all building service employees performing building service work at the premises to which a lease or financial assistance pertains are paid no less than the prevailing wage listed in the Labor Law §230 Prevailing Wage Schedule.

Covered Landlords include:

Businesses (other than not-for-profit organizations) leasing to New York City agencies commercial office space or commercial office facilities of 10,000 square feet or more where the City leases or rents no less than 51% of the total square footage of the building to which the lease applies (no less than 80% in Staten Island or in an area not defined as an exclusion area pursuant to section 421-a of the real property tax law on the date of enactment of the local law).

Covered Financial Assistance Recipients include:

Businesses (other than not-for-profit organizations) with annual gross revenues of five million dollars or more who have received financial assistance from the City of New York (as defined in New York City Administrative Code §6-130) with a total value of one million dollars or more.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

Exemptions: Business Improvement Districts and employers with manufacturing operations at the premises to which the financial assistance pertains.

The information is intended to assist you in meeting your prevailing wage obligation. You should consult New York City Administrative Code §6-130 to determine whether you are covered by this prevailing wage law. New York City Administrative Code § 6-130 requires the City to maintain an updated list of covered landlords and financial assistance recipients who are subject to the prevailing wage requirement.

Labor Law § 231 (6) and NYC Administrative Law §6-130 require contractors to post on the site of the work a current copy of this schedule of wages and supplements.

This schedule is applicable to work performed during the effective period, unless otherwise noted. Changes to this schedule are published on our web site www.comptroller.nyc.gov. Contractors must pay the wages and supplements in effect when the building service employee 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 www.comptroller.nyc.gov.

Contractors are solely responsible for maintaining original payroll records delineating, among other things, the hours worked by each employee within a given classification.

Some of the rates in this schedule are based on collective bargaining agreements. The Comptroller's Office has attempted to include all overtime, shift and night differential, Holiday, Saturday, Sunday or other premium time work. However, this schedule does not set forth every prevailing practice with respect to such rates with which employers must comply. All such practices are nevertheless part of the employer's prevailing wage obligation and contained in the collective bargaining agreements of the prevailing wage unions. These collective bargaining agreements are available for inspection by appointment. Requests for appointments may be made by calling (212) 669-4443, Monday through Friday between the hours of 9 a.m. and 5 p.m.

Answers to questions concerning prevailing trade practices may be obtained from the Classification Unit by calling (212) 669-7974. Please direct all other compliance issues to: Bureau of Labor Law, Attn: Wasyl Kinach, P.E., Office of the Comptroller, 1 Centre Street, Room 1122, New York, N.Y. 10007; Fax (212) 669-4002.

In order to meet their obligation to provide prevailing supplemental benefits to each covered employee, employers must either:

- 1) Provide bona-fide 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 benefits and wage supplements which cost the employer no less than the prevailing supplemental benefits rate in total.

Benefits are paid for EACH HOUR WORKED unless otherwise noted.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE



Office of the Comptroller
BUREAU OF LABOR LAW

CITY OF NEW YORK
OFFICE OF THE COMPTROLLER
JOHN C. LIU

BUREAU OF LABOR LAW

MUNICIPAL BUILDING
ONE CENTRE STREET, ROOM 1120
NEW YORK, N.Y. 10007-2341

TEL: (212) 669-4443
FAX: (212) 669-4002

If you are a Covered Building Service Employee and you have been paid less than the Prevailing Wage and Benefits, please contact us at 212-669-4443 or download our complaint form from our website at WWW.COMPTROLLER.NYC.GOV (click on the Bureau of Labor Law).

Si es un empleado de servicios a edificios elegible y recibió menos del sueldo prevalente y beneficios, por favor contáctenos en 212-669-4443 o descarga un formulario de reclamo del sitio del Internet WWW.COMPTROLLER.NYC.GOV (opreme "Oficina de Derecho Laboral").

Wasył Kinach, P.E.
Director of Classifications
Bureau of Labor Law

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

§230 SCHEDULE OF PREVAILING WAGES AND SUPPLEMENTAL BENEFITS ADDENDUM
EFFECTIVE PERIOD JANUARY 1, 2013 THROUGH JUNE 30, 2013

List of Amended Changes

1. MODIFIED PREAMBLE TO INCORPORATE PROVISIONS OF NYC
ADMINISTRATIVE CODE §6-130

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

TABLE OF CONTENTS

<u>CLASSIFICATION</u>	<u>PAGE</u>
BOILER SERVICEPERSON/TANK CLEANER MECHANIC (LOW PRESSURE)	6
BUILDING CLEANER AND MAINTAINER (OFFICE)	6
BUILDING CLEANER AND MAINTAINER (RESIDENTIAL)	10
BUILDING HVAC SERVICES OPERATOR	13
CLEANER (PARKING GARAGE)	14
FUEL OIL	14
GARDENER	16
LOCKSMITH	17
MEDICAL WASTE REMOVAL	17
MOVER – OFFICE FURNITURE AND EQUIPMENT	18
REFUSE REMOVER	19
SECURITY GUARD (ARMED)	19
SECURITY GUARD (UNARMED)	20
WINDOW CLEANER	22

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

BOILER SERVICEPERSON/TANK CLEANER MECHANIC (LOW PRESSURE)

Boiler Service Person/Tank Cleaner Mechanic (Low Pressure)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$11.37

Supplemental Benefit Rate per Hour: \$5.57

Overtime Description

Work in excess of 8 hours performed on a Sunday or Holiday shall be paid two and one half times the regular rate.

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.

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

Good Friday

Memorial Day

Independence Day

Labor Day

Columbus Day

Thanksgiving Day

Day after Thanksgiving

Christmas Day

Employee's Birthday

Vacation

1 year service.....five (5) days

3 years service or more.....ten (10) days

8 years service or more.....fifteen (15) days

13 years service or more.....twenty (20) days

SICK LEAVE:

1-2 years employment.....4 days

2-3 years employment.....5 days

3-4 years employment.....6 days

4-5 years employment.....8 days

6 years or more employment.....10 days

(Local #32 B/J)

BUILDING CLEANER AND MAINTAINER (OFFICE)

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

Office Building Class "A" Handyperson (Over 280,000 square feet gross area)

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$24.77

Supplemental Benefit Rate per Hour: \$9.13

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$25.10

Supplemental Benefit Rate per Hour: \$9.51

Office Building Class "A" Foreperson, Starter (Over 280,000 square feet gross area)

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$24.66

Supplemental Benefit Rate per Hour: \$9.13

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$24.99

Supplemental Benefit Rate per Hour: \$9.51

Office Building Class "A" Cleaner/Porter, Elevator Operator, Exterminator, Fire Safety Director (Over 280,000 square feet gross area)

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$22.65

Supplemental Benefit Rate per Hour: \$9.13

Supplemental Note: for new employee 0-12 months of employment - \$6.64; for new employee 13-24 months of employment - \$8.81

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$22.97

Supplemental Benefit Rate per Hour: \$9.51

Supplemental Note: for new employee 0-12 months of employment - \$6.92; for new employee 13-24 months of employment - \$9.18

NEW HIRE: Cleaner/Porter, Elevator Operator, Exterminator, Fire Safety Director may be paid 75% of the wage rate above for the first 21 months of employment, 85% of the wage rate above for the 22nd through 42nd months of employment, and upon the completion of 42 months of employment employee shall be paid the full wage rate. Note: New Hires hired before January 1, 2012 will continue to receive 80% of the wage rate above for the first 30 months, and upon the completion of 30 months of employment employee shall be paid the full wage rate. Upon completion of two years of employment the new hire receives the full supplemental benefit rate.

Office Building Class "B" Handyperson (Over 120,000 and less than 280,000 square feet gross area)

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$24.74

Supplemental Benefit Rate per Hour: \$9.13

**OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE**

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate per Hour: **\$25.07**
Supplemental Benefit Rate per Hour: **\$9.51**

Office Building Class "B" Foreperson, Starter (Over 120,000 and less than 280,000 square feet gross area)

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate per Hour: **\$24.63**
Supplemental Benefit Rate per Hour: **\$9.13**

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate per Hour: **\$24.95**
Supplemental Benefit Rate per Hour: **\$9.51**

Office Building Class "B" Cleaner/Porter, Elevator Operator, Exterminator, Fire Safety Director (Over 120,000 and less than 280,000 square feet gross area)

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate per Hour: **\$22.62**
Supplemental Benefit Rate per Hour: **\$9.13**
Supplemental Note: for new employee 0-12 months of employment - \$6.64; for new employee 13-24 months of employment - \$8.81

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate per Hour: **\$22.94**
Supplemental Benefit Rate per Hour: **\$9.51**
Supplemental Note: for new employee 0-12 months of employment - \$6.92; for new employee 13-24 months of employment - \$9.18

NEW HIRE: Cleaner/Porter, Elevator Operator, Exterminator, Fire Safety Director may be paid 75% of the wage rate above for the first 21 months of employment, 85% of the wage rate above for the 22nd through 42nd months of employment, and upon the completion of 42 months of employment employee shall be paid the full wage rate. Note: New Hires hired before January 1, 2012 will continue to receive 80% of the wage rate above for the first 30 months, and upon the completion of 30 months of employment employee shall be paid the full wage rate. Upon completion of two years of employment the new hire receives the full supplemental benefit rate.

Office Building Class "C" Handyperson (Less than 120,000 square feet gross area)

Effective Period: 7/1/2012 - 12/31/2012
Wage Rate per Hour: **\$24.70**
Supplemental Benefit Rate per Hour: **\$9.13**

Effective Period: 1/1/2013 - 6/30/2013
Wage Rate per Hour: **\$25.02**
Supplemental Benefit Rate per Hour: **\$9.51**

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

Office Building Class "C" Foreperson, Starter (Less than 120,000 square feet gross area)

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: **\$24.59**

Supplemental Benefit Rate per Hour: **\$9.13**

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: **\$24.91**

Supplemental Benefit Rate per Hour: **\$9.51**

Office Building Class "C" Cleaner/Porter, Elevator Operator, Exterminator, Fire Safety Director (Less than 120,000 square feet gross area)

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: **\$22.57**

Supplemental Benefit Rate per Hour: **\$9.13**

Supplemental Note: for new employee 0-12 months of employment - \$6.64; for new employee 13-24 months of employment - \$8.81

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: **\$22.90**

Supplemental Benefit Rate per Hour: **\$9.51**

Supplemental Note: for new employee 0-12 months of employment - \$6.92; for new employee 13-24 months of employment - \$9.18

NEW HIRE: Cleaner/Porter, Elevator Operator, Exterminator, Fire Safety Director may be paid 75% of the wage rate above for the first 21 months of employment, 85% of the wage rate above for the 22nd through 42nd months of employment, and upon the completion of 42 months of employment employee shall be paid the full wage rate. Note: New Hires hired before January 1, 2012 will continue to receive 80% of the wage rate above for the first 30 months, and upon the completion of 30 months of employment employee shall be paid the full wage rate. Upon completion of two years of employment the new hire receives the full supplemental benefit rate.

Overtime

Time and one half the regular rate after an 8 hour day.

Time and one half the regular rate for work on a holiday plus the day's pay.

Time and one half the regular hourly rate after 40 hours in any work week.

Paid Holidays

New Year's Day

President's Day

Good Friday

Memorial Day

Independence Day

Labor Day

Columbus Day

Thanksgiving Day

Day after Thanksgiving

Christmas Day

Vacation

**OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE**

Less than 6 months of work.....no vacation
6 months of work.....three (3) days
1 year of work.....ten (10) days
5 years of work.....fifteen (15) days
15 years of work.....twenty (20) days
21 years of work.....twenty-one (21) days
22 years of work.....twenty-two (22) days
23 years of work.....twenty-three (23) days
24 years of work.....twenty-four (24) days
25 years or more of work.....twenty-five (25) days
Plus two Personal Days per year.

Sick Leave:

10 sick days per year.

Unused sick leave paid in the succeeding January, one full day pay for each unused sick day.

(Local #32 B/J)

BUILDING CLEANER AND MAINTAINER (RESIDENTIAL)

Residential Building Class "A" Handyperson

Residential Buildings Class "A": buildings where the assessed value of the land and building, based upon the 1935 assessment, divided by the number of rooms in the building, gives an assessed value of over \$4000.00 a room.

Effective Period: 7/1/2012 – 4/20/2013

Wage Rate per Hour: **\$22.94**

Supplemental Benefit Rate per Hour: **\$8.68**

Supplemental Note: Effective 1/1/2013 - \$9.43

Effective Period: 4/21/2013 - 6/30/2013

Wage Rate per Hour: **\$23.57**

Supplemental Benefit Rate per Hour: **\$9.43**

Residential Building Class "A" Cleaner/Porter

Residential Buildings Class "A": buildings where the assessed value of the land and building, based upon the 1935 assessment, divided by the number of rooms in the building, gives an assessed value of over \$4000.00 a room.

Effective Period: 7/1/2012 - 4/20/2013

Wage Rate per Hour: **\$20.77**

Supplemental Benefit Rate per Hour: **\$8.68**

Supplemental Note: for new employee 0-12 months of employment - \$6.37; for new employee 13-24 months of employment - \$8.43

Effective 1/1/2013 - \$9.43; for new employee 0-12 months of employment - \$6.92; for new employee 13-24 months of employment - \$9.18

Effective Period: 4/21/2013 - 6/30/2013

**OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE**

Wage Rate per Hour: \$21.34

Supplemental Benefit Rate per Hour: \$9.43

Supplemental Note: for new employee 0-12 months of employment - \$6.92; for new employee 13-24 months of employment - \$9.18

NEW HIRE: Porter/Cleaner, may be paid a starting rate of 80% of the hourly rate published above. Upon completion of 30 months of employment, the new hire shall be paid the full wage rate. Upon completion of two years of employment the new hire receives the full supplemental benefit rate.

Residential Building Class "B" Handyperson

Residential Building Class "B": buildings where the assessed value of the land and building, based upon the 1935 assessment, divided by the number of rooms in the building, gives an assessed value of over \$2000.00 a room and not over \$4000.00 a room.

Effective Period: 7/1/2012 - 4/20/2013

Wage Rate per Hour: \$22.88

Supplemental Benefit Rate per Hour: \$8.68

Supplemental Note: Effective 1/1/2013 - \$9.43

Effective Period: 4/21/2013 - 6/30/2013

Wage Rate per Hour: \$23.51

Supplemental Benefit Rate per Hour: \$9.43

Residential Building Class "B" Cleaner/Porter

Residential Building Class "B": buildings where the assessed value of the land and building, based upon the 1935 assessment, divided by the number of rooms in the building, gives an assessed value of over \$2000.00 a room and not over \$4000.00 a room.

Effective Period: 7/1/2012 - 4/20/2013

Wage Rate per Hour: \$20.71

Supplemental Benefit Rate per Hour: \$8.68

Supplemental Note: for new employee 0-12 months of employment - \$6.37; for new employee 13-24 months of employment - \$8.43

Effective 1/1/2013 - \$9.43; for new employee 0-12 months of employment - \$6.92; for new employee 13-24 months of employment - \$9.18

Effective Period: 4/21/2013 - 6/30/2013

Wage Rate per Hour: \$21.28

Supplemental Benefit Rate per Hour: \$9.43

Supplemental Note: for new employee 0-12 months of employment - \$6.92; for new employee 13-24 months of employment - \$9.18

NEW HIRE: Porter/Cleaner, may be paid a starting rate of 80% of the hourly rate published above. Upon completion of 30 months of employment, the new hire shall be paid the full wage rate. Upon completion of two years of employment the new hire receives the full supplemental benefit rate.

Residential Building Class "C" Handyperson

**OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE**

Residential Building Class "C": buildings where the assessed value of the land and building, based upon the 1935 assessment, divided by the number of rooms in the building, gives an assessed value of \$2000.00 or less a room.

Effective Period: 7/1/2012 - 4/20/2013

Wage Rate per Hour: \$22.83

Supplemental Benefit Rate per Hour: \$8.68

Supplemental Note: Effective 1/1/2013 - \$9.43

Effective Period: 4/21/2013 - 6/30/2013

Wage Rate per Hour: \$23.45

Supplemental Benefit Rate per Hour: \$9.43

Residential Building Class "C" Cleaner/Porter

Residential Building Class "C": buildings where the assessed value of the land and building, based upon the 1935 assessment, divided by the number of rooms in the building, gives an assessed value of \$2000.00 or less a room.

Effective Period: 7/1/2012 - 4/20/2013

Wage Rate per Hour: \$20.65

Supplemental Benefit Rate per Hour: \$8.68

Supplemental Note: for new employee 0-12 months of employment - \$6.37; for new employee 13-24 months of employment - \$8.43

Effective 1/1/2013 - \$9.43; for new employee 0-12 months of employment - \$6.92; for new employee 13-24 months of employment - \$9.18

Effective Period: 4/21/2013 - 6/30/2013

Wage Rate per Hour: \$21.23

Supplemental Benefit Rate per Hour: \$9.43

Supplemental Note: for new employee 0-12 months of employment - \$6.92; for new employee 13-24 months of employment - \$9.18

NEW HIRE: Porter/Cleaner, may be paid a starting rate of 80% of the hourly rate published above. Upon completion of 30 months of employment, the new hire shall be paid the full wage rate. Upon completion of two years of employment the new hire receives the full supplemental benefit rate.

Overtime

Time and one half the regular rate after an 8 hour day.

Time and one half the regular rate for work on a holiday plus the day's pay.

Time and one half the regular hourly rate after 40 hours in any work week.

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

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

Christmas Day

Vacation

6 months.....three (3) days
1 year.....ten (10) days
5 years.....fifteen (15) days
15 years.....twenty (20) days
21 years.....twenty-one (21) days
22 years.....twenty-two (22) days
23 years.....twenty-three (23) days
24 years.....twenty-four (24) days
25 years.....twenty-five (25) days
Plus two Personal Days per year.

SICK LEAVE

After 1 year of service.....ten (10) days per year

(Local #32 B/J)

BUILDING HVAC SERVICES OPERATOR

Engineer (Refrigeration)

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: **\$34.15**

Supplemental Benefit Rate per Hour: **\$15.44**

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: **\$35.18**

Supplemental Benefit Rate per Hour: **\$15.78**

Fireperson

Fireperson (Helper): Assists the Engineer

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: **\$26.59**

Supplemental Benefit Rate per Hour: **\$15.09**

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: **\$27.39**

Supplemental Benefit Rate per Hour: **\$15.41**

Overtime Description

All hours worked on a holiday shall be paid at two and one half times the regular wage rate in lieu of the paid day off.

Overtime

Time and one half the regular rate after an 8 hour day.

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

Time and one half the regular rate for Saturday.
Time and one half the regular rate for Sunday.

Paid Holidays

New Year's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day
Plus six (6) floating Holidays

Vacation

6 months	three (3) days
1 year	ten (10) days
5 years	fifteen (15) days
15 years	twenty (20) days
21 years.....	twenty-one (21) days
22 years	twenty-two (22) days
23 years	twenty-three (23) days
24 years	twenty-four (24) days
25 years	twenty-five (25) days

(Local #94)

CLEANER (PARKING GARAGE)

Garage Cleaner

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$10.00

Supplemental Benefit Rate per Hour: \$1.50

Overtime

Time and one half the regular rate after an 8 hour day or after 40 hours in any work week.

(NYC Administrative Code §6-109)

FUEL OIL

Fuel Oil, Coal, Fuel Gas, Petroleum Product Chauffeur (5th Year and above)

Effective Period: 7/1/2012 - 12/15/2012

Wage Rate per Hour: \$30.11

Supplemental Benefit Rate per Hour: \$18.80

Effective Period: 12/16/2012 - 6/30/2013

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

Wage Rate per Hour: \$30.61
Supplemental Benefit Rate per Hour: \$19.80
Supplemental Note: Effective 1/1/2013 - \$20.42

Fuel Oil, Coal, Fuel Gas, Petroleum Product Chauffeur (4th Year)

Effective Period: 7/1/2012 - 12/15/2012
Wage Rate per Hour: \$27.50
Supplemental Benefit Rate per Hour: \$18.80

Effective Period: 12/16/2012 - 6/30/2013
Wage Rate per Hour: \$28.00
Supplemental Benefit Rate per Hour: \$19.80
Supplemental Note: Effective 1/1/2013 - \$20.42

Fuel Oil, Coal, Fuel Gas, Petroleum Product Chauffeur (3rd Year)

Effective Period: 7/1/2012 - 12/15/2012
Wage Rate per Hour: \$25.50
Supplemental Benefit Rate per Hour: \$18.80

Effective Period: 12/16/2012 - 6/30/2013
Wage Rate per Hour: \$26.00
Supplemental Benefit Rate per Hour: \$19.80
Supplemental Note: Effective 1/1/2013 - \$20.42

Fuel Oil, Coal, Fuel Gas, Petroleum Product Chauffeur (2nd Year)

Effective Period: 7/1/2012 - 12/15/2012
Wage Rate per Hour: \$23.50
Supplemental Benefit Rate per Hour: \$18.80

Effective Period: 12/16/2012 - 6/30/2013
Wage Rate per Hour: \$24.00
Supplemental Benefit Rate per Hour: \$19.80
Supplemental Note: Effective 1/1/2013 - \$20.42

Fuel Oil, Coal, Fuel Gas, Petroleum Product Chauffeur (1st Year)

Effective Period: 7/1/2012 - 12/15/2012
Wage Rate per Hour: \$21.50
Supplemental Benefit Rate per Hour: \$18.80

Effective Period: 12/16/2012 - 6/30/2013
Wage Rate per Hour: \$22.00
Supplemental Benefit Rate per Hour: \$19.80
Supplemental Note: Effective 1/1/2013 - \$20.42

Overtime

**OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE**

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
Lincoln's Birthday
Washington's Birthday
Memorial Day
Independence Day
Labor Day
Columbus Day
Election Day
Veteran's Day

Triple time the regular rate for work on the following holiday(s).

New Year's Day
Thanksgiving Day
Christmas Day

Paid Holidays

New Year's Day
Martin Luther King Jr. Day
Lincoln's Birthday
Washington's Birthday
Memorial Day
Independence Day
Labor Day
Columbus Day
Election Day
Veteran's Day
Thanksgiving Day
Christmas Day

Vacation

Less than 75 days worked.....no vacation.
75 days worked, but less than 110 days worked in a calendar year.....five (5) days the following year.
110 days or more worked in a calendar year.....ten (10) days the following year.

SICK LEAVE:

1 day sick leave earned for each 40 days worked in the preceding calendar year for a maximum of five (5) days per calendar year.

(Local #553)

GARDENER

Gardener

Effective Period: 7/1/2012 - 6/30/2013

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$230 PREVAILING WAGE SCHEDULE

Wage Rate per Hour: **\$17.04**

Supplemental Benefit Rate per Hour: **\$1.72**

Overtime

Time and one half the regular rate after an 8 hour day or after 40 hours in any work week.

(Based on data from NYS Department of Labor Occupational Employment Statistics and US Department of Labor Bureau of Labor Statistics)

LOCKSMITH

Locksmith

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$21.46**

Supplemental Benefit Rate per Hour: **\$5.89**

Overtime

Time and one half the regular rate after an 8 hour day or after 40 hours in any work week.

(Based on data from NYS Department of Labor Occupational Employment Statistics and US Department of Labor Bureau of Labor Statistics)

MEDICAL WASTE REMOVAL

Driver

Effective Period: 7/1/2012 - 3/31/2013

Wage Rate per Hour: **\$17.75**

Supplemental Benefit Rate per Hour: **\$8.79**

Effective Period: 4/1/2013 - 6/30/2013

Wage Rate per Hour: **\$18.00**

Supplemental Benefit Rate per Hour: **\$9.34**

Helper

Effective Period: 7/1/2012 - 3/31/2013

Wage Rate per Hour: **\$14.00**

Supplemental Benefit Rate per Hour: **\$8.79**

Effective Period: 4/1/2013 - 6/30/2013

Wage Rate per Hour: **\$14.25**

Supplemental Benefit Rate per Hour: **\$9.34**

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$230 PREVAILING WAGE SCHEDULE

Tractor Trailer Driver

Effective Period: 7/1/2012 - 3/31/2013

Wage Rate per Hour: **\$20.25**

Supplemental Benefit Rate per Hour: **\$8.79**

Effective Period: 4/1/2013 - 6/30/2013

Wage Rate per Hour: **\$20.50**

Supplemental Benefit Rate per Hour: **\$9.34**

Overtime Description

Time and one half the regular hourly rate after an 8 hour day or after 40 hours in any work week. The seventh day of work in a workweek is paid at double time the regular hourly rate. Time and one half the regular hourly rate for work on a holiday plus days pay for below paid holidays.

Paid Holidays

Presidents' Day

Memorial Day

Independence Day

Labor Day

Thanksgiving Day

Christmas Day

Vacation

1 year of service but less than five years.....10 days

5 years of service but less than ten years.....15 days

10 years of service.....16 days

11 years.....17 days

12 years.....18 days

13 years.....19 days

14 years.....20 days

20 years.....21 days

21 years.....22 days

22 years.....23 days

23 years.....24 days

24 years.....25 days

Plus 5 Personal Days

(Local #813)

MOVER – OFFICE FURNITURE AND EQUIPMENT

Heavy and Tractor Trailer Truck Driver

Tractor-trailer combination or a truck with a capacity of at least 26,000 pounds Gross Vehicle Weight (GVW)

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: **\$23.11**

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

Supplemental Benefit Rate per Hour: \$4.10

Light Truck Driver

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$18.08

Supplemental Benefit Rate per Hour: \$4.10

Laborer and Freight, Stock, and Material Movers, Hand

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$17.68

Supplemental Benefit Rate per Hour: \$4.10

Overtime

Time and one half the regular rate after an 8 hour day or after 40 hours in any work week.

(Based on data from NYS Department of Labor Occupational Employment Statistics and US Department of Labor Bureau of Labor Statistics)

REFUSE REMOVER

Refuse Remover

Effective Period: 7/1/2012 - 6/30/2013

Wage Rate per Hour: \$27.62

Supplemental Benefit Rate per Hour: \$4.10

Overtime

Time and one half the regular rate after an 8 hour day or after 40 hours in any work week.

(Based on data from NYS Department of Labor Occupational Employment Statistics and US Department of Labor Bureau of Labor Statistics)

SECURITY GUARD (ARMED)

Security Guard (Armed)

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$27.75

Supplemental Benefit Rate per Hour: \$4.73

Supplemental Note: for new employee 0-30 days of employment - \$4.09; for new employee 31-120 days of employment - \$4.26; for new employee 121 days - 2 years of employment - \$4.37

Effective Period: 1/1/2013 - 6/30/2013

**OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$230 PREVAILING WAGE SCHEDULE**

Wage Rate per Hour: \$28.00

Supplemental Benefit Rate per Hour: \$4.90

Supplemental Note: for new employee 0-30 days of employment - \$4.26; for new employee 31-120 days of employment - \$4.43; for new employee 121 days - 2 years of employment - \$4.54

Months of employment shall be defined as an Employee's length of service with the Employer or at the Facility, whichever is greater.

Overtime Description

A guard who works a holiday is paid the regular rate plus receives the paid holiday.

Supplemental Benefits shall be paid for each hour paid, up to forty (40) paid hours per week.

Overtime

Time and one half the regular rate after an 8 hour day.

Time and one half the regular hourly rate after 40 hours in any work week.

Paid Holidays

New Year's Day

President's Day

Memorial Day

Independence Day

Labor Day

Thanksgiving Day

Christmas Day

Vacation

Months on payroll	Vacation with Pay
6	3 days
12	5 days
24	10 days
60	15 days
180	20 days
300	25 days

Sick Leave

Employees accrue paid sick leave at the rate of one (1) sick day for every six (6) months worked, up to a maximum of six (6) days a year.

(Local #32B/J)

SECURITY GUARD (UNARMED)

Security Guard (Unarmed) 0 - 6 months

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$12.60

Supplemental Benefit Rate per Hour: \$4.37

Supplemental Note: for new employee 0-30 days of employment - \$4.09; for new employee 31-120 days of employment - \$4.26

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$12.85

Supplemental Benefit Rate per Hour: \$4.54

Supplemental Note: for new employee 0-30 days of employment - \$4.26; for new employee 31-120 days of employment - \$4.43

Security Guard (Unarmed) 7 - 12 months

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$13.10

Supplemental Benefit Rate per Hour: \$4.37

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$13.35

Supplemental Benefit Rate per Hour: \$4.54

Security Guard (Unarmed) 13 - 18 months

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$13.60

Supplemental Benefit Rate per Hour: \$4.37

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$13.85

Supplemental Benefit Rate per Hour: \$4.54

Security Guard (Unarmed) 19 - 24 months

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$14.10

Supplemental Benefit Rate per Hour: \$4.37

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$14.35

Supplemental Benefit Rate per Hour: \$4.54

Security Guard (Unarmed) 25 - 30 months

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$14.60

Supplemental Benefit Rate per Hour: \$4.73

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$14.85

Supplemental Benefit Rate per Hour: \$4.90

Security Guard (Unarmed) 31 months or more

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$14.75

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$230 PREVAILING WAGE SCHEDULE

Supplemental Benefit Rate per Hour: \$4.73

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$15.15

Supplemental Benefit Rate per Hour: \$4.90

Months of employment shall be defined as an Employee's length of service with the Employer or at the Facility, whichever is greater.

Overtime Description

A guard who works a holiday is paid the regular rate plus receives the paid holiday.

Supplemental Benefits shall be paid for each hour paid, up to forty (40) paid hours per week.

Overtime

Time and one half the regular rate after an 8 hour day.

Time and one half the regular hourly rate after 40 hours in any work week.

Paid Holidays

New Year's Day
President's Day
Memorial Day
Independence Day
Labor Day
Thanksgiving Day
Christmas Day

Vacation

Months on payroll	Vacation with Pay
6	3 days
12	5 days
24	10 days
60	15 days
180	20 days
300	25 days

Sick Leave

Employees accrue paid sick leave at the rate of one (1) sick day for every six (6) months worked, up to a maximum of six (6) days a year.

(Local #32B/J)

WINDOW CLEANER

Window Cleaner

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$26.12

Supplemental Benefit Rate per Hour: \$9.13

Effective Period: 1/1/2013 - 6/30/2013

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
\$230 PREVAILING WAGE SCHEDULE

Wage Rate per Hour: \$26.44

Supplemental Benefit Rate per Hour: \$9.51

Power Operated Scaffolds, Manual Scaffolds, and Boatswain Chairs

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$28.37

Supplemental Benefit Rate per Hour: \$9.13

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$28.69

Supplemental Benefit Rate per Hour: \$9.51

Window Cleaner Apprentice (0 - 3 months)

Employee must be a registered apprentice with the New York State Department of Labor

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$19.35

Supplemental Benefit Rate per Hour: \$0.00

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$19.59

Supplemental Benefit Rate per Hour: \$0.00

Window Cleaner Apprentice (4 - 7 months)

Employee must be a registered apprentice with the New York State Department of Labor

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$20.92

Supplemental Benefit Rate per Hour: \$9.13

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$21.18

Supplemental Benefit Rate per Hour: \$9.51

Window Cleaner Apprentice (8 - 11 months)

Employee must be a registered apprentice with the New York State Department of Labor

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: \$22.17

Supplemental Benefit Rate per Hour: \$9.13

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: \$22.44

Supplemental Benefit Rate per Hour: \$9.51

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

Window Cleaner Apprentice (12 - 15 months)

Employee must be a registered apprentice with the New York State Department of Labor

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: **\$23.43**

Supplemental Benefit Rate per Hour: **\$9.13**

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: **\$23.72**

Supplemental Benefit Rate per Hour: **\$9.51**

Window Cleaner Apprentice (16 - 17 months)

Employee must be a registered apprentice with the New York State Department of Labor

Effective Period: 7/1/2012 - 12/31/2012

Wage Rate per Hour: **\$24.70**

Supplemental Benefit Rate per Hour: **\$9.13**

Effective Period: 1/1/2013 - 6/30/2013

Wage Rate per Hour: **\$25.01**

Supplemental Benefit Rate per Hour: **\$9.51**

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

Martin Luther King Jr. Day

President's Birthday

Good Friday

Memorial Day

Independence Day

Labor Day

Columbus Day

Thanksgiving Day

Day after Thanksgiving

Christmas Day

Personal Day

Vacation

After 7 months but less than 1 year of service.....5 days

1 year but less than 5 years of service.....10 days

5 years of service but less than 15 years of service.....15 days

15 years of service but less than 21 years of service.....20 days

21 years.....21 days

22 years.....22 days

OFFICE OF THE COMPTROLLER, CITY OF NEW YORK
§230 PREVAILING WAGE SCHEDULE

23 years.....23 days
24 years.....24 days
25 years or more of service.....25 days
Plus 1 day per year for medical visit

SICK LEAVE:

10 days after one year worked. Unused sick days to be paid in cash.

(Local #32 B/J)

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 01000

GENERAL CONDITIONS

APPLICABLE TO ALL CONTRACTS

THIS PAGE INTENTIONALLY LEFT BLANK

Table of Contents

Section 01000 - General Conditions

	Title	Page #
1.01	Applicability of General Conditions	1
1.02	Scope and Intent	1
1.03	Provisions Referenced in the Contract.....	3
1.04	Contract Drawings	6
1.05	Shop Drawings and Record Drawings	7
1.06	Approval of Materials.....	12
1.07	Delivery of Materials.....	15
1.08	Temporary Structures	16
1.09	Surveys	16
1.10	Contractor's Superintendent.....	17
1.11	Permits.....	17
1.12	Transportation.....	18
1.13	Sleeves And Hangers	18
1.14	Cutting And Patching.....	18
1.15	Temporary Heat	19
1.16	Scaffolding and Platforms.....	24
1.17	Hoists and Hoistways	26
1.18	Certificates of Approval	27
1.19	Acceptance Tests	27
1.20	Progress Photographs	27
1.21	Job Meetings	28
1.22	Guarantees and Warranties	28
1.23	Removal of Rubbish and Surplus Materials	30
1.24	Cleaning	30
1.25	Inspections by Other City Agencies	30
1.26	Security Guards/Fire Guards on the Site.....	30
1.27	Contractor's Daily Reports	31
1.28	Alternate or Substitute Equipment	31
1.29	Sleeve and Penetration Drawings.....	32
1.30	Location of Partitions	32
1.31	Furniture and Equipment.....	32
1.32	Overtime Work (Ordered by Commissioner)	32
1.33	Compliance with OSHA Regulations	32
1.34	Temporary Services	33
	PART A.....	33
	PART B.....	34
1.35	Temporary Use, Operation and Maintenance of Elevators during Construction.....	34
	PART A - FOR NEW BUILDINGS UP TO AND INCLUDING 15 STORIES.....	34
	PART B - FOR NEW BUILDINGS OVER 15 STORIES.....	36
	PART C - EXISTING BUILDINGS	39
1.36	General Mechanical Requirements.....	40
1.37	General Electrical Requirements.....	43
	PART A - PROCEDURE--ELECTRICAL APPROVALS.....	43
	PART B - TEMPORARY LIGHTING, SITE SECURITY LIGHTING & POWER	45

	PART C - ELECTRICAL INSTALLATION PROCEDURE.....	48
	PART D - ELECTRICAL CONDUIT SYSTEM INCLUDING BOXES (PULL, JUNCTION AND OUTLET)	52
	PART E - ELECTRICAL WIRING DEVICES.....	56
	PART F - ELECTRICAL CONDUCTORS AND TERMINATIONS	56
	PART G - CIRCUIT PROTECTIVE DEVICES.....	59
	PART H - DISTRIBUTION CENTERS.....	60
	PART I - MOTORS	62
	PART J - MOTOR CONTROL EQUIPMENT	64
	PART K - SCHEDULE OF ELECTRICAL EQUIPMENT	66
1.38	Safety	66
1.39	Interruption of Services and of Project Facilities	66
1.40	Separation of Work Between Trades.....	67
1.41	Shop Drawing and Material Samples Schedule	67
1.42	Specific Requirements	68

The ADDENDUM TO THE GENERAL CONDITIONS is contained in Volume 3 of the Contract Documents. Volume 3 contains the following:

- Addendum to the General Conditions
- Specifications

SECTION 01000 GENERAL CONDITIONS

PART 1 - GENERAL

1.01 Applicability of General Conditions

- A. Since there are several separate Contracts pertaining to the construction of this project, for convenience, the General Conditions are stated only once. These General Conditions are applicable to all Contracts and shall constitute an integral part of each separate Contract to the same extent as though they were repeated in full therein.
- B. The Contractor is advised that various sections of these General Conditions are amended by the Addendum to the General Conditions. This Addendum also includes various schedules referred to in these General Conditions (Schedules A through F). These schedules contain important information that is specific to this project. The Addendum, including Schedules A through F, is set forth in Volume 3 of the Contract Documents.
- C. Throughout these General Conditions, various responsibilities and obligations are assigned to each of the following four Contractors: (1) General Construction, (2) Plumbing, (3) Heating/Ventilating/Air-Conditioning/Fire Protection, and (4) Electrical. In the event the Project does not involve all four Contracts, the responsibilities and obligations of each omitted Contract shall be assigned to one of the Contracts which is included in the Project. The Addendum to the General Conditions specifies which Contractor shall perform the responsibilities and obligations of each omitted contract, as set forth in the General Conditions.

1.02 Scope and Intent

- A. DESCRIPTION OF PROJECT - Refer to the Addendum to the General Conditions for a description of this project.
- B. PROGRESS SCHEDULE
 - 1. Within 15 days after the Notice to Proceed, the Contractor for General Construction Work shall prepare a composite Job Progress Chart that shall indicate graphically and chronologically the time the various parts of the work of all Contracts shall commence and be completed. The Chart shall be in a reproducible form approved by the Commissioner.
 - 2. Immediately after the Notice to Proceed of their Contracts, the Contractors for Plumbing Work, Heating, Ventilating and Air Conditioning Work (HVAC) and Electrical Work, as applicable, shall furnish all necessary data to the Contractor for General Construction Work, and cooperate in all respects in connection with formulation of the Chart.
 - 3. The Chart shall show the sequence and interrelationship of each operation of all the Contracts.
 - 4. The Chart shall show the estimated time for fabrication and/or delivery of all materials and equipment required for the work.
 - 5. As directed by the Resident Engineer, the Contractors shall meet with each other and with the Resident Engineer to review and make the necessary adjustments to the composite Job Progress Chart, and to coordinate the work indicated thereon. (Article 12 of the Contract).
 - 6. When completed, the Job Progress Chart shall be signed and dated by each Contractor or their official representative. The Resident Engineer is authorized to sign the Chart for the Department of Design and Construction. Thereafter, the Chart shall be modified only with the Commissioner's approval. When directed by the Commissioner, the Chart shall be revised and updated. If necessary, a new revised Chart shall be prepared in the same manner as outlined above for the original Chart.

7. The approved Chart shall be distributed by the Contractor for General Construction Work, as follows: the original and two (2) copies to the Resident Engineer, two (2) copies to each Contractor, and two (2) copies to the Department of Design and Construction
 8. All Contractors shall consult the approved Progress Chart and install their work within the time limits indicated on the Chart.
 9. The Resident Engineer shall post in a prominent place in the field office a copy of the Chart and mark thereon the progress of the work, including the times when various parts of the work commenced and were completed.
- C. **COMPLETION OF WORK** - Work to be done under each separate Contract comprises the furnishing of all labor, materials, equipment and other appurtenances and obtaining of all regulatory agency approvals necessary and required to complete the construction work in accordance with the Contract.
- D. **OMISSION OF DETAILS** - All work called for in the Specifications applicable to each separate Contract but not shown on the Contract Drawings in their present form, or vice versa, is required, and shall be performed by the Contractor as though it were originally delineated or described. Such work is deemed included in the Bid Price.
- E. **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 shall be performed by the Contractor. Such work is deemed included in the Bid Price.
- F. **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, shall 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 shall be made upon that basis.
- G. **CONFLICT BETWEEN CONTRACT DRAWINGS AND SPECIFICATIONS** - Should any conflict occur in or between the Drawings and Specifications, the Contractor shall be deemed to have estimated on the most expensive way of doing the work unless the Contractor shall have asked for and obtained a decision in writing from the Commissioner before the submission of the bid as to what shall govern.
- H. **COOPERATION BETWEEN CONTRACTORS** - Inasmuch as the completion of the project within the prescribed limit of time is dependent largely upon the close and active cooperation of all those engaged therein, it is therefore expressly understood and agreed that the Contractor shall lay out and install all work at such time or times and in such manner as not to delay or interfere with the carrying forward of the work of other Contractors. In the event of any dispute arising as to possible or alleged interference between the various Contractors which may retard the progress of the work, the dispute shall be adjudicated by the Commissioner, whose decision as to the party or parties at fault and as to the manner in which the matter may be adjudicated, shall be binding and conclusive on all parties.
- I. **"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 shall, unless expressed otherwise, imply the direction, requirements, permission, order, designation or prescription of the Commissioner.
- J. **"APPROVED," ETC.** - "Approved," "acceptable," "satisfactory," and words of similar import shall mean and intend approved, acceptable or satisfactory to the Commissioner.
- K. **CONFLICTS OF INTERESTS** - The Charter of the City of New York, Section 2604, provides a number of safeguards in relation to conflicts of interest. Such safeguards include, without limitation, the following: "No public servant shall receive compensation except from the City for performing any official duty or accept or receive any gratuity from any person whose interest may be affected by the

public servant's official action."

1. Other sections of the City Charter, the Administrative Code and the Penal Law are applicable in implementing the basic Conflicts of Interest Section and under certain circumstances penalties may be invoked against the donor as well as the recipient of any form of valuable gift.
2. Notice is hereby given that sections of the City Charter, the Administrative Code and the Penal Law alluded to herein shall apply under the terms of this Contract to circumstances relevant to conflicts of interest and shall be extended in application to subcontractors authorized to perform work, labor and services pursuant to this Contract and further, it shall be the duty and responsibility of the Contractors to so inform their respective subcontractors.

1.03 Provisions Referenced in the Contract

- 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 to the General Conditions, sets forth 1) the referenced Articles of the Contract, and 2) the specific requirements applicable to each respective Contract.
- B. Applications for Extensions of Time, as indicated in Article 13 of the Contract, shall be made in accordance with the Rules of the Procurement Policy Board.
- C. **PARTIAL PAYMENTS FOR MATERIALS IN ADVANCE OF THEIR INCORPORATION IN THE WORK PURSUANT TO ARTICLE 42 OF THE "CONTRACT"** - In order to better insure 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 shall 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 shall be accompanied by a schedule of the types and quantities of materials, and shall 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 shall be stored at a place 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 shall set apart and separately store at the place or places of storage all materials and shall clearly mark same "PROPERTY OF THE CITY OF NEW YORK", and further, shall 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 Resident Engineer.
 3. Where the materials are to be stored at the site, they shall be stored at such locations as shall be designated by the Resident Engineer and only in such quantities as, in the opinion of the Resident Engineer, will not interfere with the proper performance of the work by the Contractor or by other Contractors then engaged in performing work on the site. Such materials shall not be removed from their place of storage on the site except for incorporation in the work, without the approval of the Resident Engineer.
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 shall 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 shall be payable to the City of New York. It shall be in such terms and amounts as shall be approved by the Commissioner and shall be

placed with a company duly licensed to do business in the State of New York. The Contractor shall 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 shall 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 shall 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, shall 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 shall have and may exercise any and all other remedies at law for the recovery of such cost, charges and expenses. There shall be no increase in the Contract price for such costs, charges and expenses and the Contractor shall not make any claim or demand for compensation therefor.
6. The Contractor shall 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 shall 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, shall 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 and Specifications, the Contractor shall remove and replace, at Contractor's own cost, such defective or improperly incorporated material with materials complying with the Contract and Specifications. Until such materials are replaced, the City will deduct from the value of the stored materials or from any other money due the Contractor, the amount paid by the City for such rejected or improperly incorporated materials.
9. Payments for the cost of materials made hereunder shall 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 shall 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 shall 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 shall 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 shall 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 shall 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 therefor from the Comptroller. Failure on the part of the Contractor to submit satisfactory evidence that all such materials have been paid for in full, shall preclude the Contractor from payments under the Contract.
14. The Contractor shall include in each succeeding partial estimate requisition a summary of materials stored which shall 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 shall 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.

D. EXCISE AND TRANSPORTATION TAXES- Pursuant to Section 6 of the "Information for Bidders", the Contractor may be exempted from the payment of Federal Excise and Transportation Taxes in accord with the following:

1. Excise Tax Exemption Certificate will be certified by the Department of Design and Construction where requested by the Contractor, for items which fall within the scope of the Contract and which may be exempt from Federal Excise Tax.
2. TRANSPORTATION TAX - The 3% Federal Tax has been repealed and is hereby deleted from the Contract. The 10% Federal Tax for travel remains in effect.

E. CORRESPONDENCE - There shall be six (6) copies of all letters of correspondence to the Department of Design and Construction. An additional copy of all correspondence shall be sent directly to the Resident Engineer at the job site.

F. MOBILIZATION PAYMENT - A line item for mobilization shall be allowed on the Contractor's Detailed Estimate Breakdown submitted in accordance with Article 41 of the Contract. The Mobilization Payment is 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 shall be deemed included in the total Contract Price. The Detailed Estimate shall reflect, and the Mobilization Payment shall be made, in accordance with the following schedule:

Contract Amount			Percent	Mobilization	
Less than	\$	50,000	x	0 =	0
\$	50,000 - \$	100,000		= \$	6,000
\$	100,001 - \$	500,000	x	6 = \$	6,000 (min) - \$ 30,000 (max)

\$ 500,001 - \$ 2,500,000	x	5	=	\$ 30,000 (min) - \$ 125,000 (max)
Over \$ 2,500,000	x	4	=	\$ 125,000 (min) - \$ 300,000 (max)

The Contractor may requisition for one-half (1/2) of the Mobilization Payment upon satisfactory completion of the following:

1. Installation of any required field office(s).
2. Submission of all required insurance certificates and bonds.
3. Approval by the Department of Design and Construction of the coordinated progress schedule for the project and the Contractor's Shop Drawing schedule.

The remaining balance of the Mobilization Payment may be requisitioned only after 10 percent (10%) of the Contract price, exclusive of the total amount of Mobilization Payments made or to be made hereunder, shall have been approved for payment.

1.04 Contract Drawings

- A. **SCHEDULE C** - The Contract Drawings are listed in Schedule C, which is set forth in the Addendum to the General Conditions. Such drawings referred to in the Contract, and in the applicable Specifications for the various Contracts bear the general title:

City of New York
Department of Design and Construction
Division of Structures

- B. **DOCUMENTS FURNISHED TO THE CONTRACTOR** - After the award of the Contract, the Contractor for General Construction Work will be furnished with five (5) sets of paper prints of all Contract Drawings mentioned in Paragraph A above.

- C. **PRINTS (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)**

Each Contractor, other than the Contractor for General Construction Work referred to in Paragraph B, will receive two (2) sets of paper prints of all Drawings listed in Paragraph A and three (3) sets of paper prints of all Contract Drawings applying directly to each Contractor's own Contract.

- D. Each Contractor will receive nine (9) complete sets of Specifications.
- E. **ADDITIONAL COPIES** of Drawings and Specifications, when requested, will be furnished to the Contractor if available.
- F. **COORDINATION AND COOPERATION** - Since the Contracts are all related to the project, the Contractor shall consult and study the requirement of the Contract Drawings and Specifications of all Contracts furnished to the Contractor, 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.
- G. **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.
- H. **COMPENSATION** - Where Supplementary Drawings entail extra work, compensation therefor to the Contractor shall be subject to the terms of the "Contract". The Supplementary Drawings shall be binding upon the Contractor with the same force as the Contract Drawings.

- I. **SUPPLEMENTARY DRAWING PRINTS** - Three (3) copies of prints of these Supplementary Drawings will be furnished to the Contractor.
- J. **COPIES TO SUBCONTRACTORS** - The Contractor shall 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.
- K. **CONTRACTOR TO CHECK DRAWINGS** - The Contractor shall verify all dimensions, quantities and details shown on the Contract Drawings, Schedules, or other data received from the Commissioner, and shall notify the Commissioner of all errors, omissions, conflicts and discrepancies found therein. Notice of such errors shall be given before the Contractor proceeds with any work. Figures shall be used in preference to scale dimensions and large-scale drawings in preference to small-scale drawings.

1.05 Shop Drawings and Record Drawings

A. SHOP DRAWINGS

1. **SUBMISSION OF SHOP DRAWINGS** - For instructions relative to Shop Drawings involving electrical or mechanical work or equipment of any nature called for in any Contract, see the General Electrical Requirements and the General Mechanical Requirements.
2. **SHOP DRAWINGS** - The Contractor shall promptly prepare and submit layout detail and Shop Drawings of such parts of the work as are indicated in the Specifications or as required. These Shop Drawings shall be made in accordance with the Contract Drawings, Specifications and Supplementary Drawings, if any. The Shop Drawings shall 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, shall preferably be on sheets of the same size as the Contract Drawings, 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 shall be numbered consecutively and shall accurately and distinctly represent 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 thicknesses and finishes.
 - e. All other information required by the Commissioner.
5. **TITLES AND REFERENCE** - Shop Drawings shall 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, if any, under which it is, or they are required.
 - c. The locations or points 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.

NOTE: In addition to the above requirements, the Shop Drawings shall bear a stamp having the following wording:

FIELD MEASUREMENTS - The Contractor certifies that it has verified and supplemented the Contract Drawings by taking all required field measurements, that said measurements correctly reflect all field conditions and that this Shop Drawing incorporates said measurements.

6. THE SUBMISSION OF SHOP DRAWINGS - The Shop Drawings shall be accompanied by a letter of transmittal, in triplicate, containing the name of the Project, the name of the Contractor, the number of Drawings, titles and any other requirements. Re-submission of the same drawings shall bear the original number of the drawings and the original titles.
7. PRELIMINARY SUBMISSION - The Contractor shall submit one (1) set of sepia Shop Drawings to the Consultant Architect/Engineer for their approval. A satisfactory Shop Drawing will be stamped "Approved", be dated and one (1) copy thereof will be returned to the Contractor by letter. Should the Shop Drawing not be approved by the Consultant Architect/Engineer, the Commissioner will return the sepia Shop Drawings with the necessary corrections and changes to be made as indicated thereon.
8. REVISIONS - The Contractor must make such corrections and changes and again submit one (1) set of sepia drawings for the approval of the Consultant Architect/Engineer. The Contractor shall revise and resubmit the Shop Drawing as required by the Consultant Architect/Engineer until approval thereof is obtained. However, Shop Drawings which have been stamped "Approved As Noted" shall be considered an "Approved" Shop Drawing and NEED NOT be revised and resubmitted.

No work called for by the Shop Drawings shall be done until the approval of the said drawings by the Consultant Architect/Engineer is given. In addition to the foregoing Shop Drawing transmissions, a copy of any Shop Drawing prepared by any of the Contractors which Shop Drawing indicated work related to, adjacent to, impinging upon, or affecting work to be done by other Contractors, shall be transmitted to the Contractors so affected. These approved Shop Drawings shall be delivered to the Resident Engineer for distribution to the affected Contractors at the job meetings and shall be so recorded in the minutes.

9. FINAL SUBMISSION - When approval of any Shop Drawing is obtained by the Contractor, it shall insert the date of the approval of the drawing and promptly furnish the Consultant Architect/Engineer with eight (8) additional prints of the approved Drawings. No work called for by the Shop Drawings shall be performed until the approval of the said drawings by the Commissioner is given. In addition to the foregoing Shop Drawing transmissions, a copy of any Shop Drawing prepared by any of the Contractors which indicates work related to, adjacent to, impinging upon, or affecting work to be done by other Contractors, shall be transmitted to the Contractors so affected. These approved Shop Drawings shall be delivered to the Resident Engineer for distribution to the affected Contractors at the job meetings and shall be so recorded in the minutes.
10. VARIATIONS - If the Shop Drawings show variations from the Contract requirements because of standard shop practice or other reasons, the Contractor shall make specific mention of such variations in its letter of submittal. Approval of the Shop Drawings shall constitute approval of the subject matter thereof only and not of any structural apparatus shown or indicated.
11. CATALOGUE CUTS - Except as otherwise prescribed herein, the submission of catalogue cuts shall conform to the procedures specified for Shop Drawings.
- a. PRELIMINARY SUBMISSION - The Contractor shall submit three (3) sets of catalogue cuts to the Consultant Architect/Engineer to approve. A satisfactory catalogue cut will be stamped

"Approved", be dated and one (1) copy thereof will be returned to the Contractor by letter. Should the catalogue cut not be approved by the Commissioner, the Commissioner will return one (1) set of such catalogue cuts with the necessary corrections and changes to be made indicated thereon.

- b. **REVISIONS** - The Contractor shall make such corrections and changes and again submit four (4) sets of the catalogue cuts, in duplicate, for the approval of the Commissioner. The Contractor shall revise and resubmit the catalogue cuts as required by the Consultant Architect/Engineer until approval thereof is obtained.

However, catalogue cuts which have been stamped "Approved As Noted" shall be considered an "Approved" catalogue cut and need not be revised and resubmitted.

- c. **FINAL SUBMISSION** - When approval of any catalogue cut is obtained by the Contractor, it shall insert the date of the approval and promptly furnish the Consultant Architect/Engineer with four (4) additional sets of the approved catalogue cuts.
12. **RESPONSIBILITY OF CONTRACTOR** - The approval of Shop Drawings will be general and shall not relieve the Contractor of responsibility for the accuracy of such Shop Drawings, nor for the proper fitting and construction of the work, nor of the furnishing of materials or work required by the Contract and not indicated on the Shop Drawings. Approval of Shop Drawings shall not be construed as approving departures from the Contract Drawings, Supplementary Drawings or Specifications.
13. **SHOP DRAWINGS AND MATERIAL SAMPLES SCHEDULE** - The Shop Drawings and Material Samples Schedule is set forth in Schedule F, which is included in the Addendum to the General Conditions. Completion of this Schedule shall be in accordance with Article 1.41 (A) of these General Conditions.
14. **PROCEDURE FOR PREPARING, FORWARDING, CHECKING AND RETURN** - of all Shop Drawings shall be, generally, as follows:

The Contractor shall make available to its subcontractors the necessary Contract Documents and have them determine dimensions and conditions in the field, particularly with reference to coordination with other trades or work under other Contractors. The Contractor shall direct its subcontractors to prepare Shop Drawings for submission to the Consultant Architect/Engineer in accordance with the requirements of these General Conditions. The Contractor shall also direct its subcontractors to "Ring Up" corrections made on all re-submissions for approval, so as to be readily seen, and that the symbol "sub" be used to identify the source of the correction or information that has been added.

The Contractor shall:

- a. Review and be responsible to the Commissioner, or the Commissioner's authorized representative, for information shown on subcontractor's Shop and Installation drawings and manufacturers' data, and also for conformity to Contract Documents.
- b. "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.
- c. Clearly designate which trade 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 Consultant Architect/Engineer.
- d. Stamp submissions "Recommended for Approval", date and forward to the Commissioner or the Commissioner's authorized representative.

In order to expedite Shop Drawing procedures, the Contractor shall write a Shop Drawing status letter directly to the Consultant Architect/Engineer, each week, containing the following subject matter:

- (1) A list of all Shop Drawings which have been sent to but not returned by the Architect or Engineer giving name of the subcontractor, drawing number, title and date of submission.
- (2) An indication of the desired priority of the return, if necessary.

NOTE: The status letter shall be prepared and sent at a given time each week, preferably Friday afternoon, to enable the Consultant Architect/Engineer to receive the letter on Monday morning. This procedure shall be maintained throughout the active Shop Drawing period of construction.

B. INTEGRATED DRAWINGS (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

1. The Contractor for General Construction Work shall provide to the Contractor for Heating, Ventilating and Air Conditioning Work reflected ceiling starting points or plans, beam soffit elevations, ceiling heights, roof openings, etc.
2. The Contractor for Heating, Ventilating and Air Conditioning Work shall prepare a drawing or drawings showing ductwork, heating and sprinkler piping. This drawing shall include location of grilles, registers, etc. and access doors in hung ceilings. Locations shall be fixed by elevations and dimensions from column center lines and/or walls.
3. The Contractor for Heating, Ventilating and Air Conditioning Work shall prepare and distribute to each of the other Contractors, the Resident Engineer and to the Consultant Architect a sepia of the above.
4. The Contractor for General Construction Work shall lay out on its sepia, the reflected ceiling plan, beam soffit elevations, ceiling heights, roof openings, etc.
5. The Contractor for Plumbing Work shall lay out its piping, valves, cleanouts, etc., indicating locations and elevations and shall indicate the necessary access doors.
6. The Contractor for Electrical Work shall indicate its fixtures, large conduit runs, clearances, pull boxes, junction boxes, sound system speakers, etc.
7. The Resident Engineer will call as many meetings with the Contractors as are necessary to resolve any conflicts that become apparent. The Resident Engineer will call on the services of the Consultant Engineer or Architect where necessary. The Resident Engineer is responsible for the coordination of the Contract Drawings.
8. Upon resolution of the conflicts, each Contractor shall enter its own work on the Resident Engineer's sepia, which will become the Master or Integrated Drawing. The Master Sepia shall be signed by each Contractor to indicate its acceptance of the arrangement of the work.
9. A reproducible copy of the Master Integrated Drawing or Drawings will be prepared and distributed by the Contractor for Heating, Ventilating and Air Conditioning Work to each Contractor and to the Consultant Architect for information.
10. Each Contractor shall prepare its Shop Drawings in accordance with the Integrated Drawings. No work will be permitted without approved Shop Drawings. It is therefore essential that this procedure be instituted as quickly as possible.
11. Contractors shall be held strictly accountable for cooperation in preparing the Integrated Drawing or Drawings.

C. RECORD DRAWINGS

1. The Department of Design and Construction, at the start of construction (kick-off meeting), will furnish to each Contractor at no cost a complete set of Contract Document mylars pertaining to the work to be performed under its Contract. It is the responsibility of each 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 mylar drawings if necessary such as Addenda Drawings and Supplementary Drawings as may be necessary to indicate all work in detail as actually completed.

NOTE TO CONTRACTOR: All professional seals must be blocked out. Title box complete with project title and Consultants' names will remain.

2. Each Contractor shall maintain, during the progress of the work, an accurate record of the work as actually installed, on Record Drawings, on mylar, in ink. These Record Drawings shall be made available to the Resident Engineer upon request.

The Contractor's attention is particularly directed to the necessity of keeping accurate records of all subsurface and concealed work, so that the Record Drawings may contain this information in exact detail and location. Record Drawings should also show all connections, valves, gates, switches, cut-outs and similar operating equipment.

Before substantial completion payment, each Contractor shall furnish to the Commissioner one (1) complete set of mylar Record Drawings, in ink indicating all of the work and locations as actually installed, plus one (1) set of paper prints which will be furnished to sponsoring agency by Department of Design and Construction.

3. Record Drawings shall 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.
4. Each Record Drawing shall bear the legend "RECORD DRAWING" in heavy block lettering, one half (1/2) inch high, and contain the following data:

RECORD DRAWING

Contractor's Name _____

Contractor'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. RECORD DRAWING TITLE SHEET - Each Contractor shall prepare a title sheet, the same size as Record Drawings, which shall contain the following:

a. Heading:

The City of New York
Department of Design and Construction
Division of Structures

b. Capital Budget Project Number (CAPIS ID)

- c. Name and Location of Project
 - d. Contractor's Name and Address
 - e. Record of changes (a caption description of work affected, and the date and number of Change Order or other authorization)
 - f. List of Record Drawings
6. All changes from Contract Drawings shall be distinctly encircled and identified by Change Order number correlating to changes listed on the "Title Sheet." The Contractor shall show within the encircled areas the work as actually installed.
7. BULLETINS, OPERATING AND SERVICE MANUALS - Where the Contractor has submitted prints in the form of technical bulletins, operating and service manuals, or other printed matter as a Shop Drawing, having diagrams or drawings thereon of a material or equipment installed in the work, the Contractor shall furnish three (3) sets thereof so that the Commissioner may have all the necessary information for the proper operation maintenance and repair of the material and equipment and the ordering of spare parts. All bulletins and operating and service manuals shall be compiled and indexed in book form for each Contract.

1.06 Approval of Materials

- A. LOCAL LAWS - All materials, appliances and types or methods of construction shall be in accordance with the Specifications and shall in no event be less than that necessary to conform to the requirements of the Building Code of the City of New York, 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 shall be submitted to the Commissioner for approval, as early as possible, to afford proper review and analysis.
- C. REPUTE OF MANUFACTURER - No manufacturer will be approved for any materials to be furnished under the Contract unless it shall be of good reputation, shall have a plant of ample capacity and shall have successfully produced similar products. All required approvals for legal use of materials and equipment such as B.S.A. and M.E.A. must be obtained prior to installation.
- D. ALL MATERIALS - fixtures, fittings, supplies and equipment furnished under the Contract shall be new and unused, except as approved by the Agency, 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.
- E. INFORMATION TO SUPPLIERS - In asking for prices on materials under any item of the Contract, the Contractor shall 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 shall inform the manufacturer or dealer of all the General Conditions and requirements herein contained.
- F. STANDARD REFERENCES - Whenever reference is made to the furnishing of materials or testing thereof to conform to the standards of any technical society, organization or body, it shall be construed to mean the latest standard, code, specification or tentative specification adopted and published at the date of advertisement for bids, even though reference has been made to an earlier standard.
- G. REFERENCES - Reference to a technical society, organization or body may be made in the Specifications by abbreviations in accordance with the following list:

A.I.A. for American Institute of Architects

A.C.I.	for American Concrete Institute
A.G.A.	for American Gas Association
A.G.M.A.	for American Gear Manufacturer Association
A.I.E.E.	for American Institute of Electrical Engineers
A.I.S.C.	for American Institute of Steel Construction
A.S.A.	for American Standards Association
A.S.T.M.	for American Society for Testing Materials
A.W.S.C.	for American Welding Society Code
A.W.W.A.	for American Water Works Association
B.S. & A.	for New York City Board of Standards & Appeals
C.I.P.R.A.	for Cast Iron Pipe Research Association
B.G. & E.	for Bureau of Gas & Electricity of the City of New York
FED. SPEC.	for Federal Specification
I.P.C.E.A.	for Insulated Power Cable Engineer's Association
NAVY SPEC.	for Navy Department Specification
N.E.C.	for National Electric Code
N.E.M.A.	for National Electrical Manufacturers Association
N.Y.B.C.	for New York City Building Code
N.Y.E.C.	for New York City Electrical Code
N.Y. SPEC.	for New York City Department of Purchase Specification
P.P.S.	for Power Piping Society
S.A.E.	for Society of Automotive Engineers Standards
S.H.B.I.	for Steel Heating Boiler Institute

- H. 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.
- I. SAMPLES OF MATERIALS - The Contractor shall submit to the Commissioner for approval, samples of all materials specified to be used in the project.
1. For samples of materials involving electrical work of any nature, see the General Electrical Requirements.
 2. Samples shall be in triplicate, of sufficient size to show the quality, type, range of color, finish and texture of the material. However, in addition thereto, after approval, three (3) additional samples showing the material, color and texture of all interior finishes, including the finishes of exposed built-in equipment, trim, glazing, fittings and fixtures, etc., shall also be furnished. The sizes of these additional samples shall be as directed by and acceptable to the Commissioner.
 3. Each of the samples shall be labeled, bearing the name and quality of the material, the Contractor's name, date, Contract and project, and the related Specification or Contract Drawing reference to the samples submitted.
 4. A letter of transmittal, in triplicate, from the Contractor requesting approval must accompany all such samples.
 5. Transportation charges to the Commissioner's office must be prepared on all samples forwarded.
 6. Samples for testing purposes shall be as required in the Specifications.
- J. SAMPLES ON DISPLAY - When samples are specified to be equal to samples in the office of the Commissioner, they shall be carefully examined by the bidders and by those whom the bidder expects to employ for the furnishing of such materials.
- K. TIMELY SUBMISSIONS LOG/SCHEDULE - Samples shall 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 approval is received, in writing, from the Commissioner. All materials shall be furnished equal in every respect to the approved samples.

- L. THE APPROVAL OF ANY SAMPLES - will be given as promptly as possible, and shall be only for the characteristic color, texture, strength, or other feature of the material named in such approval, and no other. When this approval is issued by the Commissioner, 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 Commissioner, for the project.
- M. ACCEPTIBILITY OF TEST DATA - The Commissioner will be the final judge as to acceptability of laboratory test data and performance in service of materials submitted.
- N. 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.
- O. EQUIVALENT QUALITY OF MATERIALS - All materials and equipment which are designated in the Specifications by a number in the catalogue of any manufacturer or by a manufacturer's grade or trade name, are designated for the purpose of describing the article and fixing the standard or the quality and finish. Materials and equipment, which are, in the opinion of the Commissioner, the equivalent to that specified, will be acceptable.
- P. The submission of any material, or article, as the equal of the materials or articles set forth in the Specifications as a standard shall be accompanied by illustrations, drawings, descriptions, catalogues, records of tests, samples and any and all other information essential for judging the equality to the materials, finish and durability of that specified as standard, as well as information indicating satisfactory use under similar operating conditions.
- Q. MANUFACTURER'S DIRECTIONS - Where the Specifications provide that the manufacturer's directions are to be used, such printed directions shall be submitted to the Commissioner.
- R. COMMISSIONER TO SELECT INSPECTORS - Except as specifically provided in the Specifications, the Commissioner will select and designate all persons, firms, or corporations to make or witness each and every inspection, test or analyses, with or without reports.
- S. NOTICE - The Contractor shall give notice in writing to the Commissioner sufficiently in advance of its intention to commence the manufacture or preparation of materials especially manufactured or prepared for use in or as part of the permanent construction. Such notice shall 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.
- T. NO SHIPPING BEFORE INSPECTION - The Contractor shall comply with the foregoing before shipping any material.
- U. CERTIFICATE OF MANUFACTURE - When the Commissioner so requires, the Contractor shall 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 shall 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 B.S.A., M.E.A., B.E.C. Advisory Board, etc.

- V. **ACCEPTANCE** - When materials or manufactured products shall comprise 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.
- W. **TESTING COMPLIANCE** - The testing personnel shall make the necessary inspections and tests, and the reports thereof shall 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.
- X. **REPORTS** - Six (6) copies of the reports shall be submitted and authoritative certification thereof must be furnished to the Commissioner as prerequisite for the acceptance of any material or equipment.
- Y. **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 without cost to the City.
- Z. **FURNISH DESIGNATED MATERIAL** - Upon rejection of any material or equipment submitted as the equivalent of that specifically named in the Specifications, the Contractor shall immediately proceed to furnish the designated material or equipment.
- AA. **COST OF TESTS BORNE BY CITY** - Where the City directs test 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.
- BB. **COST OF TESTS BORNE BY CONTRACTOR** - Where tests are specifically called for in the Specifications to be made by the Contractor, the cost thereof shall be borne by the Contractor and shall be deemed to be included in the Contract price. The expenses of the testing personnel assigned by the City shall not be the Contractor's obligation. The Contractor shall reimburse the City for expenditures incurred in the making of tests on materials and equipment submitted by the Contractor as the equivalent of that specifically named in the Specifications and rejected for non-compliance.

1.07 Delivery of Materials

- A. **MATERIAL ORDERS** - The Contractor shall furnish to the Commissioner a copy of each material order, indicating date of order and quantity of material, and shall also notify the Commissioner when materials have been delivered to the site and in what quantities.
- B. **AMPLE QUANTITIES** - The Contractor shall deliver materials in ample quantities to insure 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 shall be delivered with unbroken seals and shall bear proper labels.
- D. **THE CONTRACTOR SHALL COORDINATE DELIVERIES** - in order to avoid delaying or impeding the progress of the work of any related Contractor.
- E. **STACKING** - All materials shall be properly stacked in convenient places adjacent to the site, or where directed, and protected in a satisfactory manner. Stacked materials shall be so arranged as to not interfere with visibility of traffic control devices.
- F. **OVERLOADING** - If authority is given to store materials in any part of the project area, they shall be so stored as to cause no overloading.
- G. **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 other Contractor, the relevant Contractor shall remove and restack such materials at no additional cost to the City.

1.08 Temporary Structures

- A. **FIELD OFFICE FOR CONTRACTOR** - The Contractor shall establish a temporary field office for its own use at the site during the period of construction, at which readily accessible copies of all Contract Documents shall be kept.
- B. The field office shall 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** - In charge of each office there shall be a responsible and competent representative of the Contractor, duly authorized to receive orders and directions and to put them into effect.
- D. **TELEPHONE ARRANGEMENTS** - Arrangements shall be made by the Contractor whereby its representative may be readily accessible by telephone.
- E. **MATERIAL SHEDS** - used by the Contractor for the storage of its materials shall 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.
- F. **SUBSTANTIAL CONSTRUCTION** - All temporary structures shall be of substantial construction and neat appearance, and shall be painted a uniform gray unless otherwise directed by the Commissioner.
- G. **ADVERTISING PRIVILEGES** - The City reserves the right to all advertising privileges. The Contractor shall not cause any signs of any kind to be displayed at the site unless specifically required herein or authorized by the Commissioner.
- H. **CONTRACTOR'S SIGN** - The Contractor shall post and keep posted, on the outside of its field office, office or exterior fence or wall at site of work, a legible sign giving 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 event of an emergency at any time.

1.09 Surveys (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

- A. **LINE AND GRADE** - The City will establish a baseline and bench mark near the site of the work for use of the Contractor in connection with the performance of the work.
- B. **RESPONSIBILITY** - The Contractor shall establish all other lines and elevations required for its work and shall be solely responsible for the accuracy thereof.
- C. **SAFEGUARD ALL POINTS** - Each Contractor shall safeguard all points, stakes, grade marks and bench marks made or established by the Contractor on the work, shall re-establish same if disturbed and bear the entire expense of rectifying the work improperly installed due to not maintaining, not protecting or removing without authorization such established points, stakes, or marks.
- D. **CITY MONUMENTS AND MARKS** - No work shall be performed near City monuments or marks so as to disturb them until the said monuments or marks have been referenced or reset or otherwise disposed of by the relevant Agency or party who installed them.
- E. **FOUNDATIONS** - The Contractor for General Construction Work shall 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 shall 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 for General Construction Work shall establish the permanent lines of exterior walls. Such Contractor shall furnish promptly, 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 for General Construction Work shall 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, shall be a licensed Surveyor and shall be subject to the approval of the Commissioner. The Surveyor shall not be a regular employee of the Contractor, nor shall the Surveyor have any interest in the Contract. The Surveyor shall not be employed by the Contractor in laying out any work, it being intended that the Surveyor's certification shall represent an independent and disinterested verification of such layout. The Surveyor shall report to the Department of Design and Construction's 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 shall 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 drawings shall be noted on the final certificate and there shall be included 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 for General Construction Work shall submit to the Department of Design and Construction for submission to the Department of Buildings a final Survey by the licensed Surveyor showing the location of the new Structure, before completion of the Structure. This Survey shall 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 Structures on the plan, together with the location and boundaries of the lot or plot upon which the Structure is constructed, curb cuts, all yard dimensions, etc.

1.10 Contractor's Superintendent

- A. **SUPERINTENDENT** - The Contractor shall devote its time and personal attention to the work and shall employ and retain at the project site, from the commencement until the entire completion of the work, a Contractor's Superintendent competent and capable of maintaining proper supervision and care of the work and acceptable to the Commissioner, who, in the absence of the Contractor, and irrespective of any superintendent or foreman employed by any subcontractor, shall see that the instructions of the Commissioner are carried out.
- B. **REPLACEMENT** - The Contractor's Superintendent on the job shall not be changed or removed without the consent of the Commissioner.

1.11 Permits

The Contractor shall 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 shall be responsible for all costs in connection with such regulatory compliance, unless otherwise specified in the Contract.

1.12 Transportation

- A. **AVAILABILITY** - It shall be the duty of the Contractor to determine the availability of transportation facilities and dockage for the use of its employees, equipment and material 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 shall 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.

1.13 Sleeves And Hangers (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

- A. **COORDINATE TO PROGRESS SCHEDULE** - Contractors required to furnish and install conduits, outlets, piping sleeves, boxes, inserts and all other materials and equipment necessary to be built into the work to be performed by the Contractor for General Construction Work, shall promptly furnish and set such sleeves or other materials in conformity with the requirements of the project.
- B. **COOPERATION OF CONTRACTORS** - All Contractors shall 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** - In the event that timely delivery of sleeves and other materials cannot be made, and to avoid delay, the affected 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 for General Construction Work shall fill around them with materials as required by the Contract. The necessary expenditures incurred for the boxing out and filling in shall be borne by the Contractor or Contractors responsible therefore.
- D. **INSERTS** - The Contractor for General Construction Work 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.

1.14 Cutting And Patching

- A. **RESPONSIBILITY** - Each Contractor shall do all cutting, patching and restoration required by its work, unless otherwise particularly specified in the Specifications of its Contract.
- B. **RESTORE WORK** - Each Contractor shall restore any work they damage that is the work of another Contractor.
- C. **COMPETENT WORKERS** - All restoration work shall 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 shall be replaced immediately by competent workers.
- D. **REMOVALS** - Each 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 article on REMOVAL OF RUBBISH AND SURPLUS MATERIALS.

1.15 Temporary Heat (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

A. GENERAL

1. Definition - The provision of Temporary Heat shall mean 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 shall include the provision of heat to permit normal operations in such occupied areas.
 - a. The provision of Temporary Heat shall be in accordance with the temperature requirements set forth in Paragraph (c) below.
 - b. The provision of Temporary Heat shall 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 shall mean that minimum force required for the safe day to day operation of the system for the provision of Temporary Heat and shall include, without limitation, heating maintenance labor and/or Firewatch as required by NYC Fire Department regulations. Operating labor may be required seven (7) days per week and during other than normal 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 shall include the provision of domestic hot water at the same temperature as the system which is being replaced. Domestic hot water shall be provided in accordance with the phasing requirements set forth in the Contract Documents.
2. Responsibility - The Contractor responsible for the provision of Temporary Heat, and all expenses in connection therewith, shall be as set forth below.
 - a. Projects Involving Enclosure of the Building
 - (1) Prior to Enclosure - Until the Commissioner determines that the building has been enclosed, as set forth in Paragraph (b) below, each Contractor shall be responsible for the provision of its own Temporary Heat.
 - (2) Post Enclosure - Once the Commissioner determines that the building, or any portion thereof, has been enclosed, as set forth in Paragraph B below, the Contractor for Heating, Ventilating and Air Conditioning Work ("HVAC Work") shall be 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). The Contractor for HVAC Work shall, 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 for HVAC Work shall provide Temporary Heat in accordance with the approved plan until written acceptance by the Commissioner of the work of all Contractors, including punch list work, unless directed otherwise in writing by the Commissioner. The responsibility of the Contractor for HVAC Work provided for herein is subject to the exception set forth in Paragraph H.3.b.(2) below.
 - b. Projects not involving Enclosure of the Building
 - (1) 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 for HVAC Work shall be responsible for the provision of Temporary Heat, except as otherwise provided in Paragraph H.3.b.(2) below.

- (2) 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 Paragraph H.3.b.(1) below, determines that the provision of Temporary Heat is necessary due to special and/or unforeseen circumstances, the Contractor for HVAC Work shall be responsible for the provision of Temporary Heat and such Contractor shall be paid for the same in accordance with Paragraph H.3.b.(1).

B. ENCLOSURE OF STRUCTURES

1. Notification - The Contractor for General Construction Work shall notify all other Contractors and the Resident Engineer at least 30 days prior to the anticipated date that the building(s) will be enclosed.
2. Commissioner Determination - The Commissioner shall determine whether the building, or any portion thereof, has been enclosed. As indicated in Paragraph A above, once the building has been enclosed, the Contractor for HVAC Work shall be responsible for the provision of Temporary Heat. The Commissioner's determination with respect to building enclosure shall 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
 - (1) A building shall 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 in Paragraph (c) below.
 - (2) Intermediate floor structures of multi-floor buildings shall be considered to be roofed subject to the same requirements of the building roof.
 - (3) 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 10 mil. plastic, 2) minimum 12 ounce waterproof canvas tarpaulins, or 3) a minimum three-eighths (3/8) inch thickness exterior grade plywood.
 - d. Temporary covers for openings shall be the responsibility of the Contractor for General Construction Work, and such work shall be deemed included in the Contractor for General Construction Work's bid price.

C. TEMPERATURE REQUIREMENTS

1. Unoccupied Buildings - The temperature requirement for the provision of Temporary Heat in unoccupied buildings shall be the GREATER of the following: 1) 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, shall be the GREATER of the following: 68 degrees Fahrenheit or the temperature requirement for the particular type of work set forth in the Contract Documents.

D. DURATION

1. The Contractor for HVAC Work shall be required to provide Temporary Heat until written acceptance by the Commissioner of the work of all Contractors, including punch list work, unless directed otherwise in writing by the Commissioner. The Contractor for HVAC Work shall be 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. The Contractor for HVAC Work shall include in its Total Bid Price all expenses in connection with the provision of Temporary Heat in accordance with the requirements specified herein.
2. The total Contract duration is set forth in consecutive calendar days in Schedule A of the General Conditions. The Table set forth below indicates the number of full heating seasons that are deemed included in various contract durations, which are specified in consecutive calendar days (ccds). At a minimum, a full heating season shall extend from October 15th to April 15th.

Contract Duration	Full Heating Seasons Required
up to 360 ccds	1 full heating season
360 to 720 ccds	2 full heating seasons
more than 720 ccds	3 full heating seasons

E. METHOD OF TEMPORARY HEAT

1. The method of temporary heat shall be in conformance with all applicable laws, rules and regulations. Prior to implementation, such method shall be subject to the written approval of the Commissioner.
2. The method of temporary heat shall:
 - 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.
3. No open fires will be permitted.
4. Electric heating will not be permitted unless required by Contract Documents and Specifications or otherwise approved by the Commissioner.
5. Direct-fired equipment will be allowed in construction areas where the use of such equipment will not damage or deteriorate the construction or finishes or be harmful to persons working in the area.

F. TEMPORARY HEATING SYSTEM

1. The temporary system for the provision of Temporary Heat provided by the Contractor for HVAC

Work following enclosure of the building shall be complete including, but not limited to, torpedo blowers and/or propane heaters subject to provisions of paragraph E above), boilers and fuel storage, pumps, radiators, unit heaters, water and heating piping, insulation and controls. The temporary system for the provision of Temporary Heat shall be capable of maintaining the minimum temperature requirements set forth in Paragraph C above.

G. THE CONTRACTOR FOR GENERAL CONSTRUCTION WORK

1. The Contractor for General Construction Work shall coordinate with the Contractor for HVAC Work in the work of providing Temporary Heat, and shall so coordinate its operations as to insure sufficient and timely performance of the work under all Contracts. The Contractor for General Construction Work shall 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 for General Construction Work shall include all expenses in connection with the supply of water for Temporary Heat in its Total Bid Price. During the period in which Temporary Heat in an enclosed building is being furnished and maintained by the Contractor for HVAC Work, the Contractor for General Construction Work shall, in order to provide proper ventilating and drying, open and close the windows and other openings when necessary for the proper execution of the work and also when directed by DDC. The Contractor for General Construction Work shall maintain all permanent or temporary enclosures at its own expense.

H. THE CONTRACTOR FOR HVAC WORK

1. Use of Permanent Heating System for Temporary Heat after Building Enclosure

- a. The Contractor for HVAC Work shall provide all labor and materials to promptly furnish and set all required equipment and 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 shall 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, shall be made by the Contractor for HVAC Work at his expense. The starting date for the warranty or guarantee period for such equipment shall be the date of Substantial Completion acceptance.
 - c. In the event that the Contractor for HVAC Work 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 for HVAC Work shall 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 shall be placed so as to comply with the requirements specified hereinbefore, and shall 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 for HVAC Work, including the placing of ancillary system equipment, shall be coordinated with the operations of all Contractors so as to insure sufficient and timely performance of the work of all Contractors. Once the permanent heating system is operating properly, the Contractor for HVAC Work shall remove all portions of the system for Temporary Heat which are not part of the permanent heating system.**
- 3. Temporary Heat Allowance for Special Conditions or and/or Unforeseen Circumstances.**
- a. The City has established an allowance in the Contract for HVAC Work for payment of costs and expenses in connection with the provision of Temporary Heat as set forth herein. The amount of such allowance is set forth on the Bid Form for the Contract for HVAC Work and shall be included in the Total Bid Price of the Contractor for HVAC Work. The Contractor for HVAC Work shall only be entitled to payment from this allowance under the conditions and in

accordance with the requirements set forth below. In the event this allowance or any portion thereof remains unexpended at the conclusion of the Contract, such allowance shall remain the sole property of the City. Should the amount of the allowance be insufficient to provide payment for the expenses specified below, the City will increase the amount of the allowance.

b. The allowance set forth herein may be utilized only under the conditions set forth below.

- (1) In the event 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, and the Commissioner determines that the provision of Temporary Heat is necessary due to special and/or unforeseen circumstances, the Contractor for HVAC Work shall be responsible for the provision of Temporary Heat, as directed by the Commissioner. The City shall pay such Contractor for all costs for labor, material, and equipment necessary and required for the same. Payment shall be made in accordance with Article 26 of the Contract, except that the cost of fuel shall be as set forth in Paragraph (c) below.
 - (2) In the event that after enclosure of the building, the Commissioner determines that (i) Contractors other than the Contractor for HVAC Work have not sufficiently advanced the work of their contracts that is necessary and required to permit the Contractor for HVAC Work to use the permanent or other heating equipment for the provision of Temporary Heat, and (ii) the Contractor for HVAC Work does not bear any responsibility for such other Contractors' failure to advance the work, the City shall pay the Contractor for HVAC Work for all differential costs for labor, material, and equipment necessary and required for the provision of a substitute system(s) for the provision of Temporary Heat or portions thereof in lieu of the permanent or other systems intended for Temporary Heat. Payment shall be made in accordance with Article 26 of the Contract, except that the cost of fuel shall be as set forth in Paragraph (c) below.
 - (3) In the event the Commissioner determines that there is a need for maintenance of the permanent heating system by the Contractor for HVAC Work after written acceptance by the Commissioner of the work of all Contractors, and that the need for such maintenance is not the fault of the Contractor for HVAC Work, the Contractor for HVAC Work shall provide the required maintenance of the permanent heating system for the period of time directed by the Commissioner. The City shall pay the Contractor for HVAC Work for the cost of direct labor and fuel necessary and required in connection with such maintenance, excluding the cost of any foremen or other supervision. Payment shall be made in accordance with Article 26 of the Contract, except that the cost of fuel shall be as set forth in Paragraph (c) below.
- c. Payment for Fuel Costs - Payment from the allowance set forth herein for the cost of fuel necessary and required to operate the system for the provision of Temporary Heat or to maintain the permanent heating system under the conditions set forth in Paragraph b above shall be limited to the direct cost of such fuel. The Contractor for HVAC Work shall not be entitled to any overhead and/or profit for such fuel costs. In order to receive payment for such fuel costs, the Contractor for HVAC Work must present original invoices for the same. DDC reserves the right to furnish the required fuel.
- d. Deduction - In the event that any amount of the allowance set forth herein is expended for payment to the Contractor for HVAC Work under the circumstances set forth in Paragraph b.(2) above, the Commissioner shall deduct and retain such amount out of moneys that are due and owing hereunder to the other Contractor(s) responsible for the failure to advance the work, as determined by the Commissioner. In the event the amount expended from the allowance exceeds the total sum due and owing to such other Contractor(s), such excess shall be paid to the City by such other Contractor(s) immediately upon demand.

I. THE CONTRACTOR FOR ELECTRICAL WORK

1. The Contractor for Electrical Work shall be responsible for providing the items set forth below and shall include all expenses in connection with such items in its Total Bid Price. The Contractor for Electrical Work shall provide such items promptly when required and shall in all respects coordinate its work with the Contractor for General Construction Work and the Contractor for HVAC Work in order to facilitate the provision of Temporary Heat by the Contractor for HVAC Work.
 - a. The Contractor for Electrical Work shall 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 his Contract.
 - b. The Contractor for Electrical Work shall 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 by the Contractor for HVAC Work. Such power shall be provided by the Contractor for Electrical Work for the duration the Contractor for HVAC Work is required to provide Temporary Heat, as set forth in Paragraph D above.
2. In providing the items set forth in Paragraph 1 above, the Contractor for Electrical Work is advised that labor may be required seven (7) days a week and/or during other than normal working hours for the period of time required by seasonal weather conditions.

J. THE CONTRACTOR FOR PLUMBING WORK

1. The Contractor for Plumbing Work shall 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 his Contract. The Contractor for Plumbing Work shall include all expenses in connection with such items of work in its Total Bid Price. The Contractor for Plumbing Work shall provide such items of work promptly when required and shall in all respects coordinate its work with the Contractor for General Construction Work and the Contractor for HVAC Work in order to facilitate the provision of Temporary Heat by the Contractor for HVAC Work.
2. In the event portions of the permanent plumbing equipment furnished by the Contractor for Plumbing Work as part of the work of his Contract are used for the provision of Temporary Heat by the Contractor for HVAC Work, either during construction or prior to acceptance by the City of the complete plumbing system, the Contractor for Plumbing Work shall be responsible to provide such plumbing equipment to the City in near perfect condition and shall make any repairs required, other than for ordinary wear and tear on the equipment, at his expense. The starting date for warranty and/or guarantee period for such plumbing equipment shall be the date of Substantial Completion acceptance by the City.
3. For Projects requiring the installation of new and/or modified gas service, as well as associated meter installations, the Contractor for Plumbing Work shall 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).

1.16 Scaffolding and Platforms

- A. **CONFORMANCE:** Unless otherwise indicated, the Contractor for General Construction is responsible for providing, erecting, installing and maintaining all temporary scaffolding and platforms which shall comply with requirements of Chapter 33 (Safeguards During Construction or Demolition) of the NYC Building Code, NYC Local Law 52 of 2005, OSHA Construction Standard 1926 Subpart L, and furnishing the following items.
- B. **RESPONSIBILITY**
 1. A Jobsite Monitor who shall be a competent person, designated and employed by the contractor who has a daily presence on the site during scaffold use. This designee must possess and

maintain a valid New York City Department of Buildings supported scaffold certificate of completion. An alternate shall also be designated, in the event that the Jobsite Monitor is absent. The Jobsite Monitor shall:

- a. Verify completeness of documentation and submittals (as described below).
 - b. Verify that inspections are performed, including pull tests (see below), reports are filed and reported deficiencies are corrected.
 - c. Monitor trades using scaffold.
 - d. Limit access to scaffold areas that are tagged for non-use.
 - e. Inform trades of scaffold load limitations.
 - f. Monitor loading of decks.
 - g. Verify that any ties that are temporarily removed are properly restored in the same shift.
 - h. Verify that outriggers and planks that are moved are properly set up and secured.
 - i. Verify that all scaffold decks in use have proper access/egress.
 - j. Verify that all open sides of decks in excess of 14 inches have proper guardrails and toe-boards.
 - k. 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.
 - l. Keep a log of significant actions and events connected with the scaffolding.
2. The Contractor shall be responsible for erection, maintenance and dismantling of the scaffold / shed in conformance with the New York City Building Code and OSHA requirements, contract documents and engineering specifications. The Contractor shall also be guided by generally accepted standards of scaffold industry practice as promulgated by the Scaffold Industry Association.
3. Scaffold Engineer is a New York State licensed PE engaged by the scaffold contractor / erector and responsible to ensure that the installation design conforms to the New York City Building Code and OSHA requirements, that the design comports with the capabilities of the components and the characteristics of the site, that scaffold loads on the host building, including netting, have been properly considered and that the design documents communicate information for erectors and users.
4. Scaffold users are trade contractors assigned to work on the scaffold. Training certificates from a New York City Department of Buildings approved training provider are mandatory. These users have the duty to become familiar with the New York City Building Code and OSHA requirements germane to users, to obey the instructions of the Jobsite Monitor and inform the Jobsite Monitor of known hazards, non-conformances or violations.

C. JOBSITE DOCUMENTATION AND SUBMITTALS:

1. NYC Department of Buildings 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;
- p. All sidewalk sheds shall be designed, engineered, signed and sealed by a Professional Engineer licensed in the State of New York;
 - 1) Generic (not job specific) engineering drawings are satisfactory for standard sheds and arrangements.
 - 2) Special engineering is required for custom sheds, site-specific problems or non-standard arrangements.

D. INSPECTIONS:

- 1. Signed inspection reports shall be issued for each inspection and pull-test below, and shall be logged and maintained on site by the Jobsite Monitor for the duration of the project.
- 2. Pull testing shall be required during design, and during or post erection, where anchorage is made into masonry. The Scaffold Engineer shall specify the test method, proof load and the number of trials.
- 3. Sidewalk sheds shall be inspected after initial installation, major modification, or damage and thence every three months. Inspections shall be by a Scaffold Engineer for custom sheds and by a competent person employed by the Contractor for standard sheds.
- 4. Scaffolds shall be inspected by the Scaffold Engineer during erection, post-erection and prior to use and thence every three months. The Scaffold Engineer shall repeat inspections after major alteration/modification, damage.
- 5. A qualified person assigned by the Contractor shall 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.
- 6. A qualified person assigned by the Contractor shall 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.
- 7. Scaffolds shall be inspected daily by the Jobsite Monitor or alternate prior to use by scaffold users.
- 8. At the completion of the project, submit all inspection documents to the Commissioner for record purposes.

E. LADDERS AND STAIRS: The Contractor for General Construction Work shall 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.

F. ACCESS AND EXITS: The ladders or temporary stairs shall 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.

1.17 Hoists and Hoistways

A. RESPONSIBILITY - The Contractor for General Construction Work shall provide adequate numbers of material hoists for the most expeditious performance of all parts of its work. All other Contractors are required to provide their own facilities for the hoisting of materials under their respective Contracts. However, these Contractors may make arrangements, whenever possible, with the Contractor for General Construction Work for the use of its hoist upon such terms and conditions as it may prescribe.

- B. LOCATIONS - No hoists shall be constructed at such locations as will interfere with, or affect the construction of, floor arches, or the work of other Contractors. 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 shall 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 meets with the Building Code of the City of New York and the approval of the Commissioner, and providing further it entails no interference with the progress of the work of any Contractor.
- D. PROTECTION FOR INTERIOR HOISTS - All interior material hoistways shall be enclosed on each floor and shall be adequately protected with appropriate safety guards. In no event shall the protection be less than that required by law.

1.18 Certificates of Approval

- A. RESPONSIBILITY - Each Contractor shall be responsible for and shall obtain all final approvals for the work installed under its 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 shall be forwarded to the Commissioner through the Resident Engineer before final acceptance of the work of the Contract.

1.19 Acceptance Tests

- A. GOVERNMENTAL AGENCIES - All equipment and appliances furnished and installed under the Contract shall conform with the requirements of the Specifications, and shall 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 TEST - Whenever the Specifications and/or any governmental agency having jurisdiction requires the acceptance test, the Contractor shall give written notice to all concerned 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 shall 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 shall 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 Controlled 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 shall only proceed as directed by the Resident Engineer. Additional costs resulting from retesting, reinspecting, replacing of material and/or damage to the work of other trades and any delay caused to the schedule shall be borne by the Contractor.

1.20 Progress Photographs (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

- A. PHOTOGRAPHER - The Contractor for General Construction Work shall employ and pay for the services of a competent photographer who shall take photographs showing the progress of the work.
- B. PHOTOGRAPHS - There shall be four (4) photographs taken each month from the commencement of the Contract to the time of completion. These photographs shall show as far as possible, the work

completed within and on the exterior of the structure. The first series of photographs shall be taken prior to the actual commencement of work at the site. In addition thereto before final payment, there shall be six (6) photographs taken of unobstructed views of the completed project or projects and site, as directed by the Commissioner and after all scaffolding, hoists, shanties, field offices or other temporary work has been removed and final cleaning done. (For demolition work included in the Contract there shall be four (4) photographs taken before commencement of demolition operations; four (4) at the mid-point of operations; and four (4) at the completion of demolition operations). The prints shall be 8" x 10" gloss finish, mounted with a one (1) inch binding flap of muslin on the left side. They shall be marked on the back with date of exposure; the title of the project; and the specific location. Three (3) copies of each photograph shall be furnished free of charge to the Department of Design and Construction. Photographs shall be taken as ordered by the Commissioner.

1.21 Job Meetings

- A. **MEETINGS SCHEDULE** - Meetings shall be held as scheduled by the Resident Engineer in his office at the site, at which time Contractors for all separate Contracts shall have their representatives present to discuss all details relative to the execution of the work.
- B. **ACCOMODATIONS** - The Contractor for General Construction Work shall provide ample tables and chairs to accommodate all present at the meetings, and table space for Contract Drawings.
- C. **AGENDA** - The Resident Engineer shall preside over these meetings. Prior to each meeting, the Resident Engineer will consult with the Contractors and will prepare an agenda of items to be discussed. In general, after informal discussion of any item on the agenda, the Resident Engineer will summarize the discussion in a brief written statement, and each Contractor will then dictate a brief statement for the record.

The Contractor for General Construction Work shall furnish all necessary typing and printing of the minutes prepared by the Consultant Architect/Engineer. Ample copies of the printed minutes shall be furnished to the Resident Engineer for distribution to all Contractors and representatives of the Commissioner.

- D. **COORDINATION** - Job meetings shall also be called by the Contractor for General Construction Work for the purpose of coordinating, expediting and scheduling the work of all Contracts in accordance with the master coordinated Job Progress Chart. All Contractors and their subcontractors, material suppliers or vendors whose presence is necessary, are required to attend. These meetings may, at the discretion of the Contractor for General Construction Work, be held at the same place and immediately following the Job Meetings held by the Resident Engineer. Minutes of these meetings shall be recorded, typed and printed by the Contractor for General Construction Work and distributed to all parties concerned.

1.22 Guarantees and Warranties - Refer to the Addendum to the General Conditions for the applicability of this article.

- 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 to the General Conditions.
- B. **FORM** - For all guarantee requirements set forth in Schedule B, the Contractor shall provide a written guaranty, in the form set forth on the following page.

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

Subscribed and sworn to before me this

day of _____, year _____

Notary Public

1.23 Removal of Rubbish and Surplus Materials

- A. RUBBISH - Rubbish shall not be thrown from the windows or other parts of the project. Mason's rubbish, dirt and other dust-producing material shall be wetted down periodically.
- B. LOCATION - Each Contractor shall sweep up and deposit, at a location designated on each floor by the Contractor for General Construction Work, all of its rubbish, debris and waste materials, as it accumulates and when directed by the Resident Engineer. Wood cratings shall be broken up, neatly bundled, tied and stacked ready for removal and be deposited at a location designated on each floor by the Contractor for General Construction Work.
- C. LABORERS - The Contractor for General Construction Work shall be responsible for the removal of all rubbish, etc., from the site. The Contractor shall remove from the designated locations all piles of rubbish, debris, waste material and wood cratings as they accumulate and when directed by the Resident Engineer, and shall remove them from the site. The Contractor shall employ and keep engaged for this purpose an adequate number of laborers.
- D. SURPLUS MATERIALS - Each Contractor shall remove from the site all surplus materials when there is no further use for same.
- E. TOOLS AND MATERIALS - At the conclusion of the work, all erection plant, tools, temporary structures and materials belonging to the Contractor shall be promptly removed.

1.24 Cleaning

Each Contractor shall thoroughly clean all equipment and materials furnished and installed and shall deliver such materials and equipment undamaged in a clean and new appearing condition at time of substantial completion.

1.25 Inspections by Other City Agencies

- A. LETTER OF COMPLETION - Just prior to substantial completion of this 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, each Contractor will be required to arrange for all final inspections by the inspectional staff of the Department of Buildings 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.

1.26 Security Guards/Fire Guards on the Site (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

A. SECURITY GUARDS (WATCHMEN)

- 1. The Contractor for General Construction Work shall provide competent Security Guards on the site until final completion of the project or earlier if so notified in writing by the Commissioner. The Security Service shall commence with the start of work. There shall be no less than one (1) Security Guard on duty every day, including Saturdays, Sunday and Holidays, 24 hours a day, except between the hours of 8:00 A.M. and 4:00 P.M. on any day which is a regular working day for a majority of the trades. This exception during the working day shall not apply after the finishing painting of the plaster work is commenced; thereafter, not less than one (1) Security Guard shall be on duty continuously, 24 hours a day, until final completion of the project or earlier if so notified in writing by the Commissioner.

2. Every Security Guard shall be required to hold a "Certificate of Fitness" issued by the Fire Department. Every Security Guard shall, during their tour of duty, perform the duties of Fire Guard in addition to their security obligations.
3. Should the Commissioner find that any Security Guard is unsatisfactory, such guard shall be replaced by the Contractor for General Construction Work upon the written demand of the Commissioner.
4. Each Security Guard furnished by the Contractor for General Construction Work shall be instructed by the Contractor for General Construction Work to include in their duties the entire construction site including the Field Office, temporary structures, and equipment, materials, etc.
5. Should the Contractor for General Construction Work or any other Contractor consider the security requirements outlined above inadequate, it shall 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 who provides the additional protection.
6. Nothing contained in this Article shall diminish in any way the responsibility of each Contractor 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 for General Construction Work shall employ Security Guards/Fire Guards at all times, 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 shall be borne by the Contractor for General Construction Work.

C. **RESPONSIBILITY** - All Contractors will be responsible for safeguarding and protecting their own work, materials, tools and equipment.

1.27 Contractor's Daily Reports

A. **DAILY REPORTS** - As soon as the Contractor has started work on the Project, it shall submit to the Resident Engineer written daily reports of the work performed the previous day by any of its employees, including the employees of its subcontractors.

B. **INFORMATION** - The reports shall be prepared by the Contractor's Superintendent and shall bear the Contractor's Superintendent signature. Each report shall contain the following information:

1. The type of materials and/or major equipment being installed by the Contractor and the total number of employees working in each category on that particular day.
2. The names of the subcontractors working and the type of materials and/or major equipment being installed by each, together with the total number of employees working for each subcontractor on that particular day.
3. The major construction equipment being used by each Contractor and/or subcontractor.

1.28 Alternate or Substitute Equipment

A. In general, the Contract Drawings and Specifications show and describe arrangements suitable for the specific items of equipment either named or described. In the event that a Contractor submits for approval, and receives such approval, a device or piece of equipment which requires connections (vacuum, gas, steam, water, air, electric, etc.) or arrangements of these services, differing from those indicated or described in the Contract Documents, it shall be incumbent upon the Contractor submitting the alternate or substitute equipment to give timely notice to the other Contractors involved so that they may make suitable alterations in the work to accommodate the substitute or alternate equipment. The Contractor making the substitution shall be responsible for any and all additional

costs incurred by any of the Contractors by virtue of the substitution of equipment for the equipment named or described in the Contract Documents.

1.29 Sleeve and Penetration Drawings (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

- 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 Contractors for the engineering trades (Plumbing, Heating, Ventilating and Air Conditioning, and Electrical) shall submit to the Department of Design and Construction 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 that it may be determined if such penetrations will materially weaken the project's structure. The sketch will be stamped and returned if approved and/or comments will be transmitted. The engineering Contractors shall continue to submit sketches as the pouring schedule and the concrete work progresses and, until approvals for the penetration sketches have been given, shall not predicate their layout work on unapproved sketches.

1.30 Location of Partitions (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

- A. Within three (3) weeks after the concrete slabs have been poured on each floor level, the Contractor for General Construction Work shall immediately locate accurately all of the partitions, including the door openings, on the floor slabs in a manner approved by the Resident Engineer.

1.31 Furniture and Equipment

- A. RESPONSIBILITY - Each Contractor is responsible for moving all loose furniture and/or equipment in all areas when 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 Resident Engineer.

1.32 Overtime Work (Ordered by Commissioner)

- A. OVERTIME - The Commissioner reserves right to order and pay for overtime work.
1. The Commissioner can order overtime work when in the Commissioner's opinion, delay occurs and such delay is not the fault of the Contractor, or
 2. When work is of such an important nature that delay in carrying such work to completion would result in serious disadvantage to the public.
- B. ORDER FOR OVERTIME WORK - When overtime work is ordered by the Commissioner, such "Order" will be issued by the Commissioner on a special form letter over the signature of the Commissioner.
- C. CONTRACTOR'S PROCEDURE PRIOR TO COMMENCING WORK
1. Make immediate application to the Commissioner of Department of Labor, State of New York, for dispensation in accordance with Subdivision 2 of Section 220 of the Labor Law.
 2. Upon receipt of such dispensation, proceed expeditiously with ordered overtime work.

1.33 Compliance with OSHA Regulations

These Contract Documents and the work hereby contemplated shall be governed, at all times, by the following Federal Laws:

- A. William Steiger Occupational Safety and Health Act of 1970, Public Law 91-596;

- B. Part 1910 - Occupational Safety and Health Standards, Chapter XVII of Title 29, Code of Federal Regulations;
- C. Part 1926 - Safety and Health Regulations for Construction, Chapter XVII of Title 29, Code of Federal Regulations.

1.34 Temporary Services

PART A (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

A. TEMPORARY WATER - during construction shall be furnished in the following manner:

1. Immediately after the Contractor for General Construction Work has been ordered by the Commissioner to start work, it shall file an application with the Dept. of Environmental Protection for the schedule of charges for water use during construction. The Contractor for General Construction Work will be responsible for payment of water charges.
2. Immediately after the Contractor for Plumbing Work has been ordered by the Commissioner to start work, it shall file an application with the Department of Environmental Protection's Bureau of Water Supply and obtain its permit to install the temporary water supply system. The system shall be installed and maintained for the use of all Contractors. A copy of the above mentioned permit shall be filed with the Commissioner. The Contractor for Plumbing Work shall 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 for Plumbing Work shall 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 for Plumbing Work shall take the necessary precautions to prevent the temporary systems from freezing.

B. TOILET FACILITIES - both exterior and interior, for the use of all Contractors, shall be furnished and installed in the following manner:

1. Toilet fixtures shall be furnished, installed and maintained in a satisfactory operating condition by the Contractor for Plumbing Work.
2. Enclosures for the toilet fixtures shall be erected and maintained by the Contractor for General Construction Work.
3. Heating for the enclosures shall be furnished, installed and maintained by the Contractor for General Construction Work.
4. Electric lighting for the enclosures shall be furnished, installed and maintained by the Contractor for Electrical Work.
5. The Contractor for General Construction Work shall keep the temporary toilet fixtures and enclosures in a clean and sanitary manner.
6. No Contractor shall cause any sanitary nuisances to be committed by its employees in or about the work. Each Contractor shall enforce all sanitary regulations of the City and State Health Authorities.

C. OVERTIME USE - Whenever any Contractor(s) work before or after the regular work hours hereinafter specified under Subparagraph D, or on a Saturday, Sunday or Holiday of any trade, such Contractor(s) shall pay the Contractor for Plumbing Work for the activation of the temporary water system and toilet facility services during such overtime periods. When more than one (1) Contractor is involved in overtime work, the costs thereof shall be prorated as determined by the Resident Engineer. When overtime is required by any or all Contractors on the work, the provisions for payment for regular time use of the temporary water supply system as specified in Subparagraph D shall apply.

- D. **ACTIVATION** - The Contractor for Plumbing Work shall bear the cost of keeping the temporary water supply system activated from a period of time 15 minutes before the established starting time of that trade which starts work earliest in the morning, to 15 minutes after the established quitting time of that trade which stops work latest in the evening. This applies to every day in the week which is established as a regular working day for aforementioned trades and holds until completion and final acceptance of the work of the Contractor for Plumbing Work or until the services are terminated by instructions from the Commissioner.

PART B (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

- A. **WATER** - The Contractor for General Construction Work will be responsible for payment of water charges. Billing will be in accordance with the Department of Environmental Protection schedule of charges for Building Purposes.
- B. **ELECTRICITY** - for temporary light and the operation of small tools, is available in the area of this project and will be furnished to the Contractor for General Construction Work by the Contractor for Electrical Work without cost.
- C. **TOILET FACILITIES** - The Contractor for General Construction Work shall arrange with the Commissioner for the temporary use of certain toilets or washrooms within the project for the use of all employees during the execution of the work.
- D. **MAINTENANCE** - The Contractor for General Construction Work shall maintain the temporary toilet facilities in a clean and sanitary manner and make all necessary repairs due to misuse.
- E. **NUISANCES** - The Contractors shall not cause any sanitary nuisance to be committed by its employees in or about the work, and shall enforce all sanitary regulations of the City and State Health Authorities.

1.35 Temporary Use, Operation and Maintenance of Elevators during Construction

PART A - FOR NEW BUILDINGS UP TO AND INCLUDING 15 STORIES (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

- A. **INSTALLATION** - The Contractor for General Construction Work shall install and complete, as indicated herein, one (1) selected main elevator in the Project for temporary operation by the Contractor for General Construction Work for the transporting of employees of all Contractors and representatives of the Department of Design and Construction and other Governmental Agencies having jurisdiction of work at the project. The Contractor for General Construction Work shall furnish, install and maintain for such elevators, 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 and maintenance of the temporary elevator and all equipment and/or parts utilized in connection therewith shall 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 for General Construction shall 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. The Contractor for General Construction shall employ and pay wages, including overtime wages if necessary, for all workers required for the operation and maintenance of the temporary elevator. The Contractor for General Construction shall be responsible for all costs for: (1) the installation of the temporary elevator, (2) maintaining the temporary elevator in clean, proper operating condition, including the cost of lubricants and/or parts for such maintenance, (3) all work in pits, shaftways and machine rooms necessary for the operation of the elevator, and (4) the replacement of the temporary elevator or parts utilized in connection therewith, if required.

- C. **ACTIVATION TIME** - The Contractor for General Construction Work shall keep the temporary elevator activated from a period of time 15 minutes before the established starting time of that trade which starts work earliest in the morning to 15 minutes after the established quitting time of that trade which stops work latest in the evening. This applies to every day in the week, which is established as a regular working day for the aforementioned trades.
- D. **COMMENCEMENT OF SERVICE** - The Contractor for General Construction Work shall begin to provide temporary elevator service using the selected main passenger elevator no later than eight (8) weeks (40 working 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 (15 working days) after the machine room roof slab, or that portion of it surrounding the elevator shaft, has been placed the following work shall have been completed:
1. The shaft shall have been completely enclosed by either the permanent or a temporary enclosure meeting the requirements of the law.
 2. The machine room shall have been made completely watertight either by permanent or temporary construction. Beams or other devices, either permanent or temporary shall be provided which will enable the safe and practicable hoisting of the elevator machinery for installation.
 3. There shall have been installed on all floors at the shaftway entrances to the elevator, solid substantial frames and either sliding or swing doors with substantial hardware and door locks and any necessary approved wire mesh barricades for adjacent shaftways.
 4. There shall have been furnished and installed solid substantial enclosures at front, back, sides and top of car platform enclosure, with emergency exit at top of car, excepting that the portion of the front at the elevator entrance shall have been provided with a substantial temporary door or gate.
- E. **ELECTRICAL INSTALLATION** - The Contractor for Electrical Work, not later than 20 calendar days after the machine room roof slab or that portion of its surrounding the elevator has been placed, shall have furnished and installed temporary or permanent power and light feeders as required for the elevator used for temporary service and shall have connected 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 shaftway and for the car control and signal traveling cables. The Contractor for Electrical Work shall make all these required connections as soon as the equipment is declared ready for such connections by the Resident Engineer. The cost of this work shall be included in the Contractor for Electrical Work's Contract.
- F. **REMOVAL** - When elevators for permanent use have been installed and are in condition for service, and when directed by the Commissioner, the Contractor for General Construction Work shall remove the temporary enclosures and all temporary elevator equipment and promptly proceed with the installation of the permanent equipment as is required under the Contract.
- G. **INSPECTION** - Before temporary elevator equipment has been removed, a joint inspection of the equipment shall be made by the Contractor for General Construction Work 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 for General Construction Work shall furnish and install new governor and compensating ropes, new traveling cables and new controller parts, etc. The car and counterweight safeties shall 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 shall be installed and payment therefor will be made in accordance with Article 26 of the Contract.
- H. **REPLACEMENT** - The Contractor for General Construction Work shall replace with new, any of the equipment or parts of the temporary elevator installation that were damaged, destroyed, or that indicate excessive wear or corrosion excepting the replacement of hoisting ropes. All shaftways, pits, motor rooms and sheave spaces used for temporary operation of elevators shall be thoroughly

cleaned. Where lubricated rails are used they shall 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., shall be borne by the Contractor for General Construction Work except for the replacement of hoisting ropes.

- I. **COSTS** - The Contractor for Electrical Work shall pay the costs of all electrical current used for operating the temporary elevators. The Contractor for General Construction Work shall provide all necessary conduit and wiring connections for the proper operation of the elevator and the signaling of the temporary elevators.
- J. **LIMITATIONS OF USE** - The temporary elevator shall not be used during its operation for hoisting of materials or removal of rubbish, but shall be limited only to the transportation of employees of all Contractors and the representatives of City Departments and other Governmental Agencies having jurisdiction of work at the project. However, the Resident Engineer may grant special permission at specified times to the various Contractors 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. The particular Contractor using the elevator for the hoisting of its material shall be responsible for any damage to the elevator during the entire period of such use. The Contractor for General Construction Work shall give notification in writing to the Resident Engineer of any alleged damage to the elevator installation within 24 hours after the elevator has been employed for the hoisting of materials by the particular Contractor(s).
- K. **PAYMENT FOR USE** - The Contractor for General Construction Work shall be paid for its operation and maintenance of the temporary elevator or permanent elevator used for temporary service at the daily rate indicated under the Item of its Contract. All other costs in connection with the elevator installation and equipment, excepting electrical work done by the Contractor for Electrical Work under its Contract, shall be included in the Contractor for General Construction Work's Contract.
- L. **LIQUIDATED DAMAGES** - The Contractor for General Construction Work will be charged at the rate of \$100 per day for each day it fails to provide the temporary elevator service described in this section beginning with the 41st working 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 for General Construction Work.
- M. **OVERTIME USE** - All Contracts. Whenever any Contractor or Contractors work before or after the regular work hours as indicated in Paragraph B above, or on a Saturday, Sunday or Holiday, such Contractor or Contractors shall pay the Contractor for General Construction Work for the operation and maintenance of the temporary elevator, if required by such Contractor or Contractors, at the daily rate indicated in the Contract but increased to reflect the difference between regular wage rates and overtime wage rates. The basic hourly charge shall be considered as one ninth (1/9) of the amount shown in the Item of the Bid form of the General Construction Work Contract. The City will not pay any Contractor for such overtime use of the elevator. When more than one (1) Contractor is involved in the overtime work, the charges shall be prorated as determined by the Resident Engineer unless otherwise agreed mutually among all the Contractors involved.

PART B - FOR NEW BUILDINGS OVER 15 STORIES (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

- A. **INSTALLATION** - The Contractor for General Construction Work shall install and complete, as indicated herein, two (2) selected main elevators in the Project for temporary operation by the Contractor for General Construction Work for the transporting of employees of all Contractors and representatives of the Department of Design and Construction and other Governmental Agencies having jurisdiction over work at the project. The Contractor for General Construction Work shall furnish, install and maintain for such elevators, 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 and maintenance of the temporary elevator and all equipment and/or parts utilized in connection therewith shall 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 will not be operated simultaneously.

- B. **RESPONSIBILITY** - The Contractor for General Construction shall 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. The Contractor for General Construction shall employ and pay wages, including overtime wages if necessary, for all workers required for the operation and maintenance of the temporary elevator. The Contractor for General Construction shall be responsible for all costs for: (1) the installation of the temporary elevator, (2) maintaining the temporary elevator in clean, proper operating condition, including the cost of lubricants and/or parts for such maintenance, (3) all work in pits, shaftways and machine rooms necessary for the operation of the elevator, and (4) the replacement of the temporary elevator or parts utilized in connection therewith, if required.
- C. **ACTIVATION TIME** - The Contractor for General Construction Work shall keep the temporary elevator activated from a period of time 15 minutes before the established starting time of that trade which starts work earliest in the morning to 15 minutes after the established quitting time of that trade which stops work latest in the evening. This applies to every day in the week, which is established as a regular working day for the aforementioned trades.
- D. **LOW RISE ELEVATOR** - The Contractor for General Construction Work shall begin to provide temporary elevator service using one (1) selected main passenger elevator no later than six (6) weeks (30 working days) after the 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) working days, after the 12th Floor slab, or that portion of it surrounding the elevator shaft, has been placed and stripped the following work shall have been completed:
1. The shaft shall have been completely enclosed up to the 12th Floor by either the permanent or a temporary enclosure meeting the requirements of the law.
 2. A temporary machine room enclosure shall have been provided at the 11th Floor and shall have been made completely watertight either by permanent or temporary construction. Beams or other devices, either permanent or temporary, shall be provided which will enable the safe and practicable hoisting of the elevator machinery for installation.
 3. There shall have been installed on all floors up to and including the 9th Floor at the shaft entrances to the elevator, solid substantial wood frames and either sliding or swing doors with substantial hardware and door locks, also any necessary approved wire mesh barricades for adjacent shaftways.
 4. There shall have been furnished and installed solid substantial enclosures at front, back, sides and top of car platform enclosure, with an emergency exit at top of car, excepting that the portion of the front at the elevator entrance shall have been provided with a substantial temporary door or gate.
- E. **ELECTRICAL INSTALLATION** - The Contractor for Electrical Work, not later than 10 calendar days after the 12th Floor slab or that portion of it surrounding the elevator, has been poured and stripped, shall have furnished and installed temporary or permanent power and light feeders as required for the elevator used for temporary service and shall have connected such feeders to the terminals on the starter panels or controllers in the temporary machine room, to the low voltage transformers and car light outlets in the center of the shaftway and for the car control and signal traveling cables. The Contractor for Electrical Work shall make all these required connections as soon as the Equipment is declared ready for such connections by the Resident Engineer. The cost of this work shall be included in the Contractor for Electrical Work's Contract.
- F. **HIGH RISE ELEVATOR** - The Contractor for General Construction Work shall begin to provide temporary elevator service to all floors, using a selected main passenger elevator, no later than eight (8) weeks (40 working 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 (15 working days) after the machine room roof slab, or that portion of it surrounding the elevator shaft, has been placed, the following work shall have been completed:

1. The shaft shall have been completely enclosed by either the permanent or temporary enclosure, meeting the requirements of the law.
2. The machine room shall have been made completely watertight either by permanent or temporary construction. Beams or other devices, either permanent or temporary shall be provided which will enable the safe and practicable hoisting of the elevator machinery for installation.
3. There shall have been installed on all floors at the shaftway entrances to the elevator, solid substantial frames and either sliding or swing doors with substantial hardware and door locks, also any necessary approved wire mesh barricades for adjacent shaftways.
4. There shall have been furnished and installed, solid substantial enclosures at front, back, sides and top of car platform enclosure, with an emergency exit at top of car, excepting that the portion of the front at the elevator entrance shall have been provided with a substantial temporary door or gate.

G. The Contractor for Electrical Work, not later than 20 calendar days after the machine room slab or that portion of it surrounding the elevator shaft has been placed, shall have furnished and installed temporary or permanent power and light feeders as required for the high rise elevator to be used for temporary service and shall have connected 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 shaftway.

The Contractor for Electrical Work shall make all these required connections as soon as the equipment is declared ready for such connections by the Resident Engineer. The cost of this work shall be included in the Contractor for Electrical Work's Contract.

H. When the high rise elevator is completed and ready for temporary operation, the low rise temporary elevator shall be shut down.

I. When one (1) or more elevators for permanent use have been installed and are in condition for service, and when directed by the Commissioner, the Contractor for General Construction Work shall remove the temporary enclosures and all temporary elevator equipment, and promptly proceed with the installation of the permanent equipment as is required under the Contract.

J. Before temporary elevator equipment has been removed, a joint inspection of the equipment shall be made by the Contractor for General Construction Work 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 for General Construction Work shall furnish and install new governor and compensating ropes, new traveling cables, new controller parts, etc. The car and counterweight safeties shall 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 shall be installed and payment therefor will be made in accordance with Article 26 of the Contract.

K. The Contractor for General Construction Work shall replace with new, any of the equipment or parts of the temporary elevator installations that were damaged, destroyed, or that indicate excessive wear or corrosion excepting the replacement of hoisting ropes. All shaftways, pits, motor rooms and sheaves spaces used for temporary operation of elevators shall be thoroughly cleaned down. Where lubricated rails are used they shall 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., shall be borne by the Contractor for General Construction Work except for the replacement of hoisting ropes.

L. The Contractor for Electrical Work shall pay the costs of all electrical current used for operating the temporary elevators. The Contractor for General Construction Work shall provide all necessary conduits and wiring connections for the proper operation of the elevators and the signaling of the temporary elevators.

- M. No temporary elevator shall be used during its operation for hoisting of materials or removal of rubbish, but shall be limited only to the transportation of employees of all Contractors and the representatives of City Departments and other governmental agencies having jurisdiction of work at the project. However, the Resident Engineer may grant special permission at specific times to the various Contractors to hoist materials which, in the Resident Engineer's opinion, will not overload or damage the elevator installation, but only after such time as all plastering has been completed from the second floor up. The particular Contractor using the elevator for the hoisting of its material shall be responsible for any damage to the elevator during the entire period of such use. The Contractor for General Construction Work shall give notification in writing to the Resident Engineer of any alleged damage to the elevator installation within 24 hours after the elevator has been employed for the hoisting of materials by the other Contractors.
- N. The Contractor for General Construction Work shall be paid for its operation and maintenance of each temporary elevator or permanent elevator used for temporary service at the daily rate indicated under the item of its Contract. All other costs in connection with elevator installation and equipment, excepting Electrical Work done by the Contractor for Electrical Work under its Contract, shall be included in the Contractor for General Construction Work's Contract.
- O. **LIQUIDATED DAMAGES** - The Contractor for General Construction Work will be charged at the rate of \$100 per day for each day it fails to provide the temporary elevator service described in this Section beginning with the 31st working day after the 12th Floor slab, or that portion of the 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 for General Construction Work.
- P. **OVERTIME USE - ALL CONTRACTS.** Whenever any Contractor(s) work before or after the regular work hours as indicated in Subparagraph B above, or on a Saturday, Sunday or Holiday, such Contractor or Contractors shall pay the Contractor for General Construction Work for the operation and maintenance of the temporary elevator, if required by such Contractor or Contractors, at the rate indicated in the Item of the bid form of the General Construction Work Contract but increased to reflect the difference between regular wage rates and overtime wage rates. The basic hourly charge shall be considered as one ninth (1/9) of the amount shown in the item of the General Construction Work Contract. The City will not pay any Contractor for such overtime use of the elevator. When more than one (1) Contractor is involved in the overtime work, the charges shall be prorated as determined by the Resident Engineer unless otherwise agreed mutually among all the Contractors involved.

PART C - EXISTING BUILDINGS (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

- A. The Contractor for General Construction Work may use, at the Commissioner's discretion, one (1) selected elevator in the project for temporary operation by the General Construction Work Contractor for the transportation of employees of all Contractors and representatives of the Department of Design and Construction and other Governmental Agencies having jurisdiction over work at the Project. The Contractor for General Construction Work shall maintain for such elevators, all necessary hoisting ropes, governor cables, traveling conductor cables, operating devices hand reset target annunciators, signal devices, and all other permanent or temporary parts. The installation and maintenance of the temporary elevator and all equipment and/or parts utilized in connection therewith shall be in accordance with the rules and regulations of all agencies and/or entities having jurisdiction over elevators in temporary use.
- B. The Contractor for General Construction shall 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. The Contractor for General Construction shall employ and pay wages, including overtime wages if necessary, for all workers required for the operation and maintenance of the temporary elevator. The Contractor for General Construction shall be responsible for all costs for: (1) the installation of the temporary elevator, (2) maintaining the temporary elevator in clean, proper operating condition, including the cost of lubricants and/or parts for such maintenance, (3) all work in pits, shaftways and machine rooms necessary for the operation of the elevator, and (4) the replacement of

the temporary elevator or parts utilized in connection therewith, if required.

- C. The Contractor for General Construction Work shall keep the temporary elevator activated from a period of time of 15 minutes before the established starting time of that trade which starts work earliest in the morning to 15 minutes after the established quitting time of that trade which stops work latest in the evening. This applies to every day in the week, which is established as a regular working day for the aforementioned trades.
- D. The Contractor for General Construction Work shall replace with new any of the equipment or parts of the elevator for temporary operation installation that were damaged, destroyed, or that indicate excessive wear or corrosion excepting the replacement of hoisting ropes. All shaftways, pits, motor rooms and sheave spaces used for temporary operation of elevators shall be thoroughly cleaned down. Where lubricated rails are used they shall 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., shall be borne by the Contractor for General Construction Work except for the replacement of hoisting ropes.
- E. The elevator for temporary operations shall be used during its operation for hoisting of materials or removal of rubbish, but shall be limited only to the transportation of employees of all Contractors and the representative of City Departments and other Governmental Agencies having jurisdiction of work at the project. However, the Resident Engineer may grant special permission at specified times to the various Contractors to hoist materials which, in the Resident Engineer's opinion, will not overload or damage the elevator installation. The particular Contractor using the elevator for the hoisting of its material shall be responsible for any damage to the elevator during the entire period of such use. The Contractor for General Construction Work shall give notification in writing to the Resident Engineer of any alleged employee for the hoisting of materials by the particular Contractor(s).
- F. The Contractor for General Construction Work shall pay all costs for the operation and maintenance of the elevator for temporary operation. All other costs in connection with the elevator and equipment excepting electrical work done by the Contractor for Electrical Work under its Contract, shall be included in the Contractor for General Construction Work's Contract.
- G. **LIQUIDATED DAMAGES** - The Contractor for General Construction Work will be charged at the rate of \$100 per day for each day it fails to provide elevator services described in this section beginning with 15 consecutive calendar days from notice to proceed. This charge will be deducted from any amount due and owing to the Contractor for General Construction Work.
- H. **OVERTIME USE - ALL CONTRACTS** - Whenever any Contractor(s) work before or after the regular work hours as indicated in Paragraph B above, or on a Saturday, Sunday or Holiday, such Contractor(s) shall pay the Contractor for General Construction Work for the operation and maintenance of the elevator, if required by such Contractor(s) at the union daily rates but increased to reflect the difference between regular wage rates and overtime wage rates. The City will not pay any Contractor for overtime use of the elevator. When more than one (1) Contractor is involved in the overtime work, the charges shall be prorated as determined by the Resident Engineer unless otherwise agreed mutually among all the Contractors involved.

1.36 General Mechanical Requirements (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

- A. The General Mechanical Requirements contained herein shall be followed by all Contractors furnishing mechanical equipment under their respective Contracts.
- B. **CONCEALED PIPING** - and ducts shall mean 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 shall be installed in the hung ceilings.
- C. **THE 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. The Contractor shall follow these Contract Drawings in laying out the work and shall consult the Contract Drawings of the other Contracts to become familiar with all conditions affecting it and to verify the spaces in which it will be installed. The Contractor shall cooperate with the Public Utilities doing certain necessary work for this project. The attention of the Contractor is called to the Contract Drawings for General Construction Work for the location, arrangement and extent of plumbing and other fixtures and equipment. All work shall be installed in locations as shown on these Contract Drawings.

- D. **CERTIFICATES** - On completion of the work, the Contractor shall obtain certificates of inspection, approval, acceptance and of compliance with all laws from all agencies and/or entities having jurisdiction over the work and shall deliver these certificates to the Commissioner. The work shall not be deemed substantially complete until the certificates have been delivered.
- E. **SHOP DRAWING SUBMITTALS** - Contractors doing mechanical work shall submit, as directed, Shop Drawings, roughing drawings, manufacturer's Shop Drawings, field drawings, cuts, bulletins, etc., of all materials, equipment and methods of installation shown or specified.
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.
- F. **ACCESSIBILITY** - All work shall be installed by the Contractor so as to be readily accessible for inspection, operation, maintenance and repair. Minor deviations from the arrangement indicated on the Contract Drawings may be made to accomplish this, but they shall not be made without approval by the Commissioner.
- G. **CHANGES IN PIPING, DUCTS, AND EQUIPMENT** - 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 shall make such changes as directed and approved, without extra cost to the City.
- H. **CLEANING OF PIPING, DUCTS, AND EQUIPMENT** - Piping, ducts and equipment shall 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 shall pay for repairs to other work damaged in the course of removing obstructions.
- I. **STANDARDIZATION OF SIMILAR EQUIPMENT** - Unless otherwise particularly specified, all equipment of the same kind, type or classification, and used for identical purposes, shall be the product of one (1) manufacturer.
- J. **MACHINERY PARTS** - shall conform exactly to the dimensions shown on the Contract Drawings. The equivalent parts of identical machines shall be identical so that they can be interchangeable.

- K. **FITTINGS** - All grease lubricating fittings on equipment shall be of a uniform type and shall be readily accessible and types proposed to be used shall be submitted for approval.
- L. **GUARDS** - All machinery shall be designed with protecting guards conforming with the requirements of the Industrial Code of the New York State Department of Labor or OSHA, whichever is stricter.
- M. **LIMIT SWITCHES** - Unless otherwise specified, limit switches and other mechanically actuated switches shall be enclosed in tight metal boxes and be installed in the proper locations ready for conduit connections. Switches shall be complete with all supports, stops, cams, arms, tripping and operating members, which shall be adjustable where required for proper functioning.
- N. **ANCHORS, BOLTS, ETC. AND FOUNDATIONS** - Unless otherwise specified, the Contractor shall furnish the necessary anchors, bolts, guides, track rails, bearing plates, substantial templates and all other appurtenances, and build the necessary foundations, as approved by the Commissioner, for all equipment supplied by the Contractor under its Contract.
- O. **EQUIPMENT DESIGN** - Equipment and appurtenances shall be designed in conformity with ASME and AIEE standards and shall be of rugged construction and of sufficient strength to withstand all stresses which may occur during fabrication, testing, transportation, installation, and all conditions of operations. Adequate stays, braces and anchors shall be provided. All bearings and moving parts shall be adequately protected against wear by bushings, or other approved means, and shall be fully lubricated by readily accessible devices. Details shall be designed for appearance as well as utility. Protruding members, joints, corners, gear covers and the like shall be finished in appearance. All exposed welds shall be ground smooth and the corners of structural shapes shall be mitered.
- P. **SUPPORTING STRUCTURES DESIGNED BY THE CONTRACTOR** - Unless otherwise specified, supporting structures for equipment to be furnished by the Contractor shall be designed and built by the Contractor of sufficient strength to safely withstand all stresses to which they may be subjected, within permissible deflections, and shall meet the following standards:
1. Structural Steel - ASTM Standard Specifications, AISC and NYBC.
 2. Concrete for supports for equipment shall conform to the Specifications for concrete herein, but in no case shall be less than the requirements of the NYBC for average concrete.
 3. Steel reinforcement for concrete shall be of intermediate grade and shall meet the requirements of the Standard Specifications for Billet Steel-Concrete Reinforcement Bars, ASTM.
- Q. **ENGINEER'S ASSUMED DESIGN DATA** - All structural steel, concrete and reinforcement indicated or specified to support the equipment or appurtenances and the area immediately adjacent thereto have been designed from data based on assumed average anticipated clearances and loading. The final structural design in these locations will be based on definite data received from the Contractor after the Commissioner approves the equipment and appurtenances to be installed. The Commissioner will then redesign, if necessary, the supporting structure to properly support and maintain the approved equipment and appurtenances. Necessary major changes in design will be covered by Supplementary Drawings that will be furnished to the Contractor. All changes indicated or necessary to accommodate the equipment and appurtenances, shall be incorporated into the Working Drawings submitted for approval, and the cost of furnishing and installing the work necessitated by these changes shall be borne by the Contractor furnishing the equipment.
- R. **INSTALLATION OF EQUIPMENT** - Equipment shall be erected in a neat and workmanlike manner on the foundations, at the locations and elevations shown on the Contract Drawings or as required. All equipment shall be correctly aligned, leveled and adjusted for satisfactory operation and shall be installed so that proper and necessary connections can be made readily between various units and with piping and equipment that may be installed under other Contracts. When required by the Specifications, the Contractor shall obtain the assistance of a competent and experienced Engineer or Superintendent, in the employ of the manufacturer, to install the equipment.

- S. **ELIMINATION OF NOISE** - All work provided under the Contract shall operate without objectionable noise or vibration.
1. 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 shall at its own expense make changes in piping, equipment, etc. and do all work necessary to eliminate objectionable noise or vibration.
 2. Should noise or vibration found objectionable by the Commissioner be transmitted by any pipe or portions of the structure from equipment installed under the Contract, the Contractor shall 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.
- T. **GROUTING** - The Contractor shall furnish all material and labor for proper bedding on Portland Cement grout, the equipment or its supporting base. Grout shall consist of one (1) part Portland Cement and one (1) part of approved sand. The top of the masonry foundation shall be properly cleaned and wetted before grouting. Grout shall completely fill all spaces between the equipment, or base, and the foundation and it shall generally average one (1) inch in thickness. Leveling wedges shall not be removed before the grout has reached its final set. Voids left by wedges shall be pointed with grout. Exposed surfaces of the grout shall have a finished appearance.
- U. **PRELIMINARY FIELD TEST** - As soon as conditions permit, the Contractor shall furnish all necessary labor and materials for, and shall 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 shall, prior to the acceptance test, make all changes, adjustments and replacements required.
- V. **INSTRUCTIONS ON OPERATION** - At the time the equipment is placed in permanent operation by the City, the Contractor shall make all adjustments and tests required by the Commissioner to prove that such equipment is in proper and satisfactory operating condition. The Contractor shall 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.

1.37 General Electrical Requirements

SCOPE - This Article 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 Article and the requirements of the Specifications and/or the Contract Drawings, whichever requirements is the most stringent, as determined by the Commissioner, shall take precedence.

PART A - PROCEDURE--ELECTRICAL APPROVALS

SCOPE- 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 contracts for other than the Contract for Electrical Work.

- A. **ELECTRIC SERVICE** - The electric service supply is subject to commercial and operating variation of the utility company. Proper provision shall be made to have all apparatus operate normally under these conditions.
- B. **SUPERVISION AND ACCEPTANCE** - The electrical work and equipment shall be installed under the supervision of the Commissioner's representative. Final acceptance and approval of the work will be contingent upon the inspection and test of the installation by the City regulatory agency, on completion.
- C. **TESTS** - The Contractor shall notify the Commissioner when the Contractor will examine and begin

work and shall also notify the Commissioner when the Contractor has completed the work and is ready to have it inspected and tested. Upon completion of the work and prior to final payment, tests shall be made as required by the Commissioner of all electrical materials, electrical and associated mechanical equipment, and of appliances installed hereunder. The Contractor shall furnish all labor and material for such tests. Should the tests show that any of the material, appliances or workmanship are not first class or not in compliance with the Contract, the Contractor on written notice shall remove and promptly replace them with other materials in conformity with the Contract.

D. **CERTIFICATE OF THE BUREAU OF ELECTRICAL CONTROL, OF THE DEPARTMENT OF BUILDINGS (B.E.C.)** - Before final payment is made, there must be filed with the Department of Design and Construction, a Certificate of Inspection signed by the Director of the B.E.C., which Certificate shall certify that all materials and workmanship comply with the rules and regulations of the B.E.C. of the City of New York and with the Electrical Code of the Administrative Code of the City of New York.

E. **RESPONSIBILITY FOR CARE AND PROTECTION OF EQUIPMENT**

1. The Contractor furnishing any equipment shall be responsible for the equipment until it has been finally inspected, tested and accepted, in accordance with the requirements of these Specifications.
2. After delivery and before and after installation, the Contractor shall protect all equipment against theft, injury or damage from all causes. The Contractor shall carefully store all equipment received for work, which is not immediately installed. If any apparatus has been subject to possible injury by water, it shall 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 apparatus or materials of the same kind, type or classification and being used for identical types of service, shall be made by the same manufacturer.

G. **CONTRACTOR'S ELECTRICAL DRAWINGS AND SAMPLES FOR APPROVAL**

1. The Contractor shall submit to the Commissioner for approval, 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 shall be included. A letter, in triplicate, shall accompany each submittal.
2. The Contractor shall submit duplicate samples of such materials and appliances as may be requested by the Commissioner for approval. These samples shall 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.

H. **TIMELINESS** - All material shall be submitted in sufficient time for the program 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.

I. **CONTRACTOR'S STATEMENT WITH SUBMITTALS** - All dimensional drawings of equipment, blueprints, catalogues, models, samples and other data relative to the equipment, the materials, the work or any part thereof submitted for approval are to be accompanied by a statement that they have been examined by the Contractor and that the drawings, data and other material submitted agree with the requirements of the Contract and Specifications and shall list and describe the points of

disagreements, if any exist. In the absence of such statement, approvals will be given with the understanding that articles of equipment or materials or methods of installation are in substantial compliance with the Contract and that if the adoption of these designs, details, articles, equipment, materials, constructions, installations, places and locations necessitate changes, alterations or replacements at an increased cost to the Contractor or others, the Contractor making the substitution for the specified equipment or material shall bear all such additional expense involved.

- J. **BULLETINS AND INSTRUCTIONS** - The Contractor shall furnish and deliver to the Commissioner, 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 B - TEMPORARY LIGHTING, SITE SECURITY LIGHTING & POWER

SCOPE - This Section sets forth the General Conditions and procedures relating to Temporary Lighting, Site Security Lighting and Power during the construction period, and is applicable to, and binding on, all Contracts insofar as they are affected.

A. TEMPORARY LIGHTING (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

1. Energy for the Temporary Lighting System for minor rehabilitation projects (those projects whose existing distribution system is not being changed or modified under the scope of this project) may be taken from the existing electrical distribution system if the existing system is of adequate capacity for the additional temporary lighting load. The Contractor for Electrical Work is to cooperate and coordinate with the facility custodian so as not to interfere with the normal operation of the facility.
2. Energy for the Temporary Lighting system for new projects and for those existing projects that are not covered in the preceding paragraph shall be provided as in the following paragraphs.
3. **CONNECTION TO UTILITY LINES** - Temporary Electric Service for use during construction shall be provided as follows: The Contractor for Electrical Work shall provide adequate service for the temporary lighting system, or a minimum of 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. The Contractor for Electrical Work shall include in its bid any charges which may be made by the Public Utility Company for extending its electrical facilities, and for making final connections. The Contractor for Electrical Work shall make payment directly to the Public Utility Company.
4. **APPLICATIONS FOR METER** - The Contractor for Electrical Work shall make 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 Lighting. The Contractor for Electrical Work shall pay to the Public Utility Company, all bills for Temporary Lighting energy used throughout the work, as they become due.
5. **SERVICE AND METERING EQUIPMENT** - The Contractor for Electrical Work shall furnish and install, at a suitable location on the site, approved service and metering equipment for the Temporary Lighting System, ready for the installation of the Public Utility Company's metering devices. The temporary service mains to and from the metering location shall be not less than 100 Amperes, 3-phase, 4-wire and shall be of sufficient capacity to take care of all demands for Temporary Lighting and Site Security Lighting and shall meet all requirements of the NYCEC.
6. The Contractor for Electrical Work shall furnish and connect to the metered service point, a system of Temporary Lighting 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 shall be located near entrance on ground floor.

7. **ITEMS** - The Temporary Lighting System shall 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, trailers 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.
8. The Temporary Lighting System shall be progressively installed as required for the advancement of the work under the various Contracts.
9. **RELOCATION** - Any Contractor requiring the relocation or extension of the original Temporary Lighting System that is not required due to the normal advancement of the work, as determined by the Commissioner's field representative, shall bear all costs thereof.
10. **TRAILERS** - Trailers shall be furnished with left-hand sockets with locked type guards and 40 feet of rubber covered cable. The Contractor for Electrical Work shall furnish and distribute a minimum of three (3) complete trailers to each Contractor. See the detailed Electrical Specifications for possible additional trailers required.
11. **LAMPS** - The Contractor for Electrical Work shall furnish and install one (1) complete set of lamps, including those for the trailers. Broken and burned out lamps in the general lighting system shall be replaced by the Contractor for Electrical Work while those in the trailers shall be replaced by the Contractor using such equipment. All lamps shall be 100 watt.
12. **CIRCUIT PROTECTION** - The Contractor for Electrical Work shall furnish and install GFI protection for the Temporary Lighting and Site Security Systems.
13. **ENERGIZING** - The Contractor for Electrical Work shall keep the Temporary Lighting System energized from a period of time, 15 minutes before the established starting time of that trade, which starts work earliest in the morning to 15 minutes after the established quitting time of that trade which stops work latest in the evening. This applies to every day in the week which is established as a regular working day for any trade involved in the construction of this facility and holds until completion and final acceptance of the work of the Contractor for Electrical Work or until the services are terminated by instructions from the Commissioner.
14. **MAINTENANCE OF TEMPORARY LIGHTS**
 - a. The Contractor for Electrical Work shall maintain the Temporary Lighting System in good working order during the scheduled hours established.
 - b. The Contractor for Electrical Work is to include in its contract all charges for energy for the Temporary Lighting System.
 - c. The Contractor is advised to show the estimated cost of the installation, maintenance and energy of temporary electrical facilities in its detailed cost estimate of its Contract so as to facilitate partial payments during construction.
15. **OVERTIME USE** - Any Contractor requiring Temporary Lighting Service before or after hours set forth hereinbefore, or on weekends or a Holiday for all trades involved in the construction of this facility, shall pay for the additional cost of keeping the system energized and repaired. If more than one (1) Contractor is involved, the charges shall be prorated, or shared by other acceptable means previously agreed upon by the Contractors involved. When overtime is required by all Contractors on the work, the provisions for payment for regular time use of the Temporary Lighting System shall apply.
16. **SERVICE BEYOND COMPLETION DATE** - When failure to comply with the terms and conditions of any Contract necessitates temporary light beyond the date set for completion of the Contract for Electrical Work, the Contractor requiring such additional service shall pay for keeping it energized. When more than one (1) Contractor requires such service, the expense thereof shall be prorated

as determined by the Commissioner.

17. **ADJUSTMENT IN CONTRACT PRICE FOR TEMPORARY LIGHTING MAINTENANCE** - In the event that the temporary lighting maintenance extends beyond the Contract time through no fault of the Contractor for Electrical Work, the additional maintenance cost will be in accordance with the requirements of the following paragraphs:
 - a. Payment for maintaining Temporary facilities when required will be made at the average hourly wage for electricians plus 69% of this rate, for each hour of work done upon order of the Resident Engineer. Payments will be included in partial estimates upon submission of detailed vouchers stating date, hour and time expended for each item of work.
 - b. The addition of 69% of the average hourly wage rate specified above shall be deemed as the total allowance for all profit and overhead and for any and all other costs and expenses of any nature whatsoever, including but not limited to allowance for insurance, workman's compensation, unemployment insurance and other supplementary benefits.
18. **REMOVAL OF TEMPORARY LIGHTING WIRING** - The temporary lighting system shall be removed by the Contractor for Electrical Work when authorized by the Commissioner.
19. **HAND TOOLS** - The temporary electric lighting system shall not be used for power purposes, excepting that light hand tools not larger than 1/4 horsepower may be operated therefrom by any Contractor.

B. SITE SECURITY LIGHTING (FOR NEW CONSTRUCTION ONLY) (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

1. The Contractor for the Electric Work shall furnish, install and maintain a system of site security lighting, as herein specified, to illuminate the construction site of the project, and it shall be connected to and energized from the Temporary Lighting System.
2. It is essential that the site security lighting system be completely installed and operating, at the earliest possible date. All Contractors must cooperate, coordinate and exert every effort to accomplish an early complete installation of the site security lighting system. After the system is installed and in operation, and a part of the system interferes with the work of any trade, that trade shall 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 shall consist of flood lighting by pole mounted guarded sealed-beam units. Floodlight units shall be mounted 16 feet above grade. Floodlights shall 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 shall be installed in a manner acceptable to the Resident Engineer. The first lighting unit in each circuit shall be provided with a photoelectric cell for automatic control. The photoelectric cell shall be installed as per manufacturer's recommendations.
4. All necessary poles shall be furnished and installed by the Contractor for Electrical Work.
5. The site security system shall be kept illuminated at all times during the hours of darkness. The Contractor for Electrical Work, at its own expense, shall keep the system in operation, furnishing and installing all material necessary to replace all damaged or burned out parts.
6. The Contractor for Electrical Work shall be on telephone call alert for maintaining the system during the operating period stated above.
7. All materials and equipment furnished under this section shall remain the property of the Contractor for Electrical Work and shall be removed and disposed of by the Contractor for

Electrical Work upon completion of that phase of the project.

C. TEMPORARY POWER

1. Any Contractor requiring temporary power for equipment larger than 1/4 horsepower shall arrange with the Public Utility for service and pay for all electrical energy consumed by its lines.
2. The Contractor shall provide service, metering equipment and distribution centers as required, and be responsible for keeping the system in working order.
3. When directed by the Commissioner, the Contractor shall remove its own temporary power system.

D. 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 for Electrical Work shall have the temporary lighting system changed over from the temporary service points to the main distribution panel.
2. **COST OF CHANGE OVER** - The Contractor for Electrical Work shall be responsible for all cost due to this change over of service and it shall 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 lighting specified herein shall be adhered to after change over of service.
4. **NO EXTRA COST** - The operation of the service and switchboard equipment shall be under the supervision of the Contractor for Electrical Work, but this shall 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 shall be no additional charge for supervision by the Contractor for Electrical Work.

PART C - ELECTRICAL INSTALLATION PROCEDURE

SCOPE - This Section sets forth the general installation procedure that shall apply to all electrical work and electrical equipment appearing in any of the Contracts.

- A. **INTENT OF CONTRACT DOCUMENTS** - Contract Specifications and Contract Drawings 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 each Contractor shall provide whatever labor and materials are found necessary, within the scope of its 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 the Department of Design and Construction. 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 accessibility for repairs, even though this selection is the most costly.
- 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 the Department of Design and Construction during construction.

- C. **SLEEVES** - required for conduits passing through walls or floors, shall be furnished and set by the Contractor installing the conduits. Sleeves in waterproofed floors shall be provided with flashing extending 12 inches in all directions from sleeve and secured to waterproofing. Flashing shall be turned down into space between pipe and sleeve and caulked watertight. Flashing shall be 20 oz. cold rolled copper. Sleeves shall be supplied with welded flanges similar to those supplied by the Contractor for Plumbing Work and shall extend one (1) inch above finished floor.
- D. **COORDINATION** - Each Contractor shall keep in close touch with the construction progress and obtain the necessary information for the accurate placement of its work in ample time before project construction operations obstruct its work. Each 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. **RESPONSIBILITY FOR ERRORS OF INSTALLATION** - In case of interference with the work of others or erroneous placement of work with respect to equipment or structures, each Contractor shall cooperate with other affected Contractors for an immediate agreeable solution of the affected work with each Contractor furnishing its responsible share of the labor and materials necessary to complete the installation in an approved manner.
- F. **RESTORATION** - If drilling or cutting is done on finished surfaces of equipment or the structure, any marring of the surface shall be repaired or replaced by the Contractor who caused the damage. Each Contractor shall 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. Any Contractor who pierces waterproofing because of the installation of their work shall, at their own expense, restore the waterproofing to the satisfaction of the Commissioner.
- G. **ELECTRICAL WORK AT SITE** - Any Contractor who is required to furnish equipment consisting of a number of related electrical devices or appliances, mounted in a single enclosure, or on a common base, shall furnish this unit complete with internal wiring, connections, terminal boxes with copper connectors and/or lugs and ample electrical leads, ready for connection and operation. The cost of any wiring, re-wiring or other work required to be done on this unit in the field, shall be borne by the Contractor who furnished the unit, without cost to the City.
- H. **COOPERATION AMONG CONTRACTORS** - Whenever an electrically operated unit or system involves the combined work of several Contractors for its installation and successful operation, each Contractor shall exercise the utmost diligence in cooperating with others to produce a complete, harmonious installation.
- I. **DEFINITIONS**
1. **WIRING** means both wire and raceway (rigid steel, heavy wall conduit unless specifically indicated otherwise).
 2. **POWER WIRING** means wiring from a panelboard 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.
 3. **CONTROL and/or INTERLOCK WIRING** means that 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.
- J. **WORK BY CONTRACTORS FURNISHING ELECTRICAL EQUIPMENT** - Any Contractor who furnishes an electrically operated or motorized unit of equipment shall install same and, as part of its Contract, perform the following work in connection therewith:
1. **FOUNDATIONS** - Unless otherwise specified or indicated, the Contractor furnishing electrically operated equipment shall also furnish and install approved foundations for same. Special

foundations, if required, will be described in the detailed Specification.

- a. **MATERIAL** - All foundations, unless required otherwise, shall rest on a structural slab and shall be of poured concrete, of a mixture specified for reinforced concrete. Foundations shall present a neat, smooth appearance without voids, sharp corners or edges.
 - b. **DIMENSIONS** - Foundation dimensions, height above floor, methods of setting, aligning and anchoring of equipment shall be as recommended by the manufacturer of equipment and approved by the Commissioner. The minimum height of foundations above finished floor shall be four (4) inches and foundations shall extend at least six (6) inches at all sides beyond the base plates of equipment.
2. At least one (1) inch of grout shall be applied under the equipment base plate after placement and alignment of the equipment.
 3. **ITEMS** - Anchor plates, bolts, sleeves, nuts and washers and other necessary items for proper installation of equipment shall be provided. The Contractor shall also furnish and set required templates to locate accurately the positions of the hold down bolts.
 4. **VIBRATION ISOLATION** - If specifically required in the detailed Specifications for a particular unit, vibration isolators shall be provided for rotating equipment.
 5. **SUPPORTS** - If any motorized equipment is required to be mounted overhead or off a wall, the Contractor supplying the unit shall furnish and install a suitable platform, bracket or shelf, whichever is appropriate or specified, and mount the equipment thereon. This support shall be constructed of substantial steel members, plates, etc., and the whole securely fastened to the structure or to anchors previously embedded in the wall or slab. In case of excessive vibration transmitted to structure, isolating pads or other devices shall be installed. The Contractor shall apply one (1) coat of approved primer paint to the support and one (1) additional coat of approved paint in the field.
 6. **ASSOCIATED EQUIPMENT** - The Contractor who furnishes a motorized or electrically operated unit of equipment shall also furnish all associated motor starters, disconnect means, relays, control devices, lamps, or other devices, necessary for the successful functioning of the unit.
 7. **POINT OF DELIVERY** - Any item specified to be installed by the Contractor for Electrical Work and delivered to the site that can not be hand carried (due to bulk, weight or timeliness) to the location of its installation is to be delivered and set in place, leveled and secured by the Contractor furnishing the equipment. Such delivery shall be to the location where it is to be installed by the Contractor for Electrical Work.
 8. **CONTROL AND INTERLOCK WIRING**
 - a. **General Construction Work and Plumbing Work.**
 - (1) All control wiring associated with doors and door hardware is to be furnished and installed, unless otherwise indicated, by the Contractor furnishing the doors. Power for the door operation and for its controls shall be furnished and installed by the Contractor for Electrical Work.
 - (2) All other control wiring associated with equipment furnished by either the Contractor for General Construction Work or the Contractor for Plumbing Work is to be furnished and installed by the Contractor for Electrical Work.
 - b. **Contractor for Heating, Ventilating and Air Conditioning Work**
 - (1) The furnishing and installing of all control devices and all control and interlock wiring for equipment furnished under the Heating, Ventilating and Air Conditioning Contract shall be

by that Contractor, including any power required for any control device.

- (2) The Contractor for Heating, Ventilating and Air Conditioning Work shall deliver to the Contractor for Electrical Work all starters and disconnect switches specified to be furnished under the Heating, Ventilating and Air Conditioning Contract. The Contractor for Electrical Work is to install the starters and disconnect switches, and furnish and install all power wiring and make connections between the starter, disconnect switch and motor or equipment being served. The motor or equipment is to be mounted by the Contractor furnishing the motor.

9. **INSTALLATION OF BURNER** - The Contractor who furnishes and installs the gas/oil-fired boiler/furnace shall also include as part of its Contract, the work of furnishing, installing and connecting all equipment, controls with necessary conduits and wiring, to a service point provided by the Contractor for Electrical Work. Unless detailed otherwise in the Specific Requirements, the Contractor for Electrical Work shall furnish power from the power source to a junction box furnished and installed by the Contractor for the Electrical Work and located near the boiler/furnace control panel. The Contractor for Electrical Work shall also furnish and install an empty conduit and a junction box to be located at a remote location (outside of the boiler/furnace room) for an emergency shut-off switch. The shut-off switch and all other conduit and wire shall be furnished and installed by the Contractor furnishing the boiler/furnace.

K. WORK BY CONTRACTOR FOR ELECTRICAL WORK - The Contractor for Electrical Work shall perform the following work:

1. **PANELETTE** - The Contractor for Electrical Work shall furnish and install a four (4) circuit panelette in each mechanical equipment room.
2. **STARTERS AND DISCONNECT SWITCHES** - The associated disconnect switches and starters approved by the Department of Design and Construction which require mounting or wiring apart from a main equipment unit shall be delivered, prewired, to the Contractor for Electrical Work at the site of the project, who shall install and wire them. The electrical Contractor shall acknowledge acceptance in writing to the Contractor supplying them, and thereafter assume responsibility for their safe keeping until final acceptance of its work by the City.
3. **CONTROL DEVICES** - The Contractor for Electrical Work shall install conduit, wire, and make all connections for all interlock and control devices furnished under the Plumbing Work Contract and also all control and interlock devices furnished under the General Construction Work Contract, except for door control wiring. The various control and interlock devices, furnished (prewired) by the Contractors for Plumbing and General Construction Work Contractors, shall be installed and final connections made by the Contractor for Electrical Work.
4. **DOOR CONTROL WIRING** - Unless specifically detailed otherwise in the Contract Documents for Electrical Work, all door control and interlock devices are to be furnished and installed and wired by the Contractor furnishing the required control and interlock devices.
5. **TESTS** - The Contractor supplying the equipment, together with the Contractor for Electrical Work shall cooperate in making preliminary tests to establish the correctness of the installation. If a faulty operation of the unit is discovered, the Contractor whose work is the cause shall, without delay, remedy the trouble.

L. PAINTING

1. **Ingredients and methods of application** shall conform to that as required for similar work under the Contract for General Construction Work.
2. **ALL METAL CABINETS** - including switchboards, panelboards, boxes (pull, junction and outlet), trims, doors and covers shall be painted as follows:

All surfaces inside and outside, one (1) approved coat of primer. All accessible surfaces one (1) coat of approved paint inside and outside, in the field after installation.

3. **HANGERS. CONDUITS AND FITTINGS** – The Contractor who installs them shall give one (1) field applied, approved coat primer, followed by a second coat.
4. **FINAL COAT**--A final or third coat of paint, as directed, shall be applied by the Contractor installing them when the wall surfaces on which they are supported or the ceiling from which they are hung are not painted by the Contractor for General Construction Work. Pull boxes shall be neatly and legibly stenciled to show service.
5. **PAINTING OF MOTORIZED EQUIPMENT** - The Contractor furnishing electrically driven equipment shall paint motors and driven equipment, starters and controllers and other equipment provided by the Contractor. The Contractor shall provide any painting or finishing that may be required in the Specifications. For certain equipment having special corrosion resistant factory finishes, painting may be waived by special permission. Equipment shall be neatly stenciled, with legible characters to indicate service by the Contractor who supplies the equipment.
6. **NAME PLATES** - shall be left clean of all paint.

PART D - ELECTRICAL CONDUIT SYSTEM INCLUDING BOXES (PULL, JUNCTION AND OUTLET) - (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

SCOPE - This Section sets forth the requirements applying to any Contract requiring the installation of electrical conduits, boxes or fittings. Rigid steel conduit shall be used through out, unless specifically indicated otherwise. **TYPES**-where the word 'conduit', without a modifier such as, rigid steel, EMT, etc., is specified to be used, it shall be interpreted to mean, rigid steel, heavy wall, threaded conduit.

A. CONDUIT TYPES

1. **RIGID STEEL CONDUIT** - shall be interpreted to mean rigid steel, heavy wall conduit that is hot dipped galvanized inside and outside. The conduit shall 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 shall be used for all exposed work, for all underground conduits in contact with earth and for fire alarms systems as required by the Building Code. Rigid steel conduit shall be used for all underground conduits in contact with earth, for Fire Alarm Systems and as required by authorities having jurisdiction.
2. **ELECTRICAL METALLIC TUBING (EMT)** - shall be industry standard thin wall conduit of galvanized steel only. All elbows, bends, couplings and similar fittings which constitute a part of the conduit system shall be specifically designed for use with electric metallic tubing. Couplings and terminating fittings shall be of the pressure type as approved by the Commissioner. Set screw fittings will not be acceptable. EMT shall meet the requirements of the latest edition, as amended, of the "Standard for Electrical Metallic Tubing of the Underwriters Laboratories Inc." 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.
3. **FLEXIBLE METALLIC** - 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 shall 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.

B. INSTALLATIONS AND APPLICATIONS

1. Unless otherwise specified or indicated on the Contract Drawings, conduit runs shall be installed

concealed in finished spaces.

2. **CONDUIT SIZES** - The sizes of conduit shall be as indicated on the Contract Drawings. Wherever conduit sizes are not indicated, the conduit shall meet the requirements of the NYCEC to accommodate the conductors to be installed therein.
3. Conduits shall be reamed smooth after cutting. No running threads will be permitted. Universal type couplings shall be used where required. Conduit joints shall be screwed up to butt. Empty conduits after installation shall have all open ends temporarily plugged to prevent the entrance of water or other foreign matter.
4. Conduits being installed in concrete or masonry shall be securely held in place by the Contractor installing them during pouring and construction operations. A group of conduits terminating together shall be held in place by a template.
5. **UNDERGROUND STEEL CONDUITS** - Unless otherwise specified, all underground steel conduits in contact with earth shall 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 shall be one (1) part cement to four and one-half (4 1/2) parts of fine and coarse aggregate.
6. **EXCAVATION RESTORATION PERMITS** - The Contractor installing underground conduits, duct banks or manholes shall perform, as part of its Contract, 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 shall 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 shall secure and pay for all necessary permits and inspection fees and pay the cost of repaving.
7. **EXPOSED CONDUIT SUPPORTS** - Exposed conduit shall be supported by zinc coated hangers with necessary inserts, beam clamps of approved design or attached to walls or ceilings by expansion bolts. Exposed conduits shall be supported or fastened at intervals not more than five (5) feet.
8. Exposed conduit shall be installed parallel or at right angles to ceiling, walls and partitions. Where direction changes of exposed conduit cannot be made with neat bends, such as required around beams or columns, conduit type fitting shall be used.
9. The conduit shall be installed with an approved expansion joint:
 - a. Wherever the conduit crosses a building expansion joint (each 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. Conduit may only enter and leave a floating slab in the vertical direction, and then only in an approved manner. Horizontal entries into floating slabs are not permitted.
11. Conduit installed in pipe shafts shall 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 shall be provided to assure stability of the raceway system.
12. **BUSHINGS AND LOCKNUTS** - Approved bushings and locknuts shall be used wherever conduits enter outlet boxes, switch boxes, pull boxes, panel board cabinets, etc. For conduits one (1) inch in diameter or larger, insulating bushings to be O.Z. or approved equal.
13. **CONDUIT BENDS** - shall be made without kinking conduit or appreciably reducing the internal diameter. All bends in conduit of two (2) inch in diameter or larger shall be made with an hydraulic or power pipe bender. The radius of the inner edge of any bend shall 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 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 shall be tested for clear bore and correct installation by the Contractor who installed them using a ball mandrel and a brush and snake before the installation will be accepted. The ball shall be of lignum vitae turned to approximately 85% of the internal diameter of the raceway to be tested. Two (2) short wire brushes shall be included in the mandrel assembly. Snaking of conduits, ducts, etc., shall be performed by the Contractor in the presence of the Electrical Inspector. Any conduits or ducts which reject the mandrel shall 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 shall be assigned to the various conduit runs, and as they test clear they shall be identified by a fiber tag not less than 1-1/4 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 shall be tagged.
- c. TEST RECORDS - As the conduit runs clear, a record shall 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 shall be signed by the Electrical Inspector and submitted in triplicate for approval. This record shall be entered on the Record drawings, which are required under "General Conditions Governing All Contracts."
- d. CAPPING - All empty conduit and duct openings, after test, shall be capped or plugged by the Contractor as directed.
- e. DRAG LINES - A drag line shall be left in all empty conduit.

C. BOXES

1. The Contractor shall furnish and erect all pull boxes indicated on the plans or where required. Sides, top and bottom of pull boxes shall be zinc coated and shall 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 shall be removable and held in place by corrosion resistant machine screws. Pull boxes in damp locations shall have threaded hubs and gaskets. All pull boxes shall be suspended from ceiling or walls in the most substantial manner.
2. For large boxes, sufficient suitable porcelain clamp insulators or other approved devices shall be provided in the pull boxes for supporting the cables passing through the box so that the cables will not be unsupported for a distance greater than three (3) feet and so as to permit a neat and orderly arrangement of the cables.
3. For pull boxes having the largest side more than nine (9) square feet in area, special rectangular and diagonal angle-iron bracing will be required as approved.
4. Pull boxes of special or odd shapes are required to be installed by the Contractor, even though not shown on plans, where necessary to overcome interference or to facilitate the pulling of conductors in conduits.
5. 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. Precautions should be exercised regarding the location of window and door trims,

paneling, etc. Mistakes resulting from failure to observe these precautions, must be corrected by the Contractor without cost to the City. Outlets in hung ceilings shall be supported from the black iron or structure.

6. The exact location of all outlets in finished rooms shall be as directed. When the interior finish has been applied, the Contractor shall make any necessary adjustment of its work to properly center the outlets. All outlet boxes for local switches near doors shall be located at the strike side of doors as finally hung, whether so indicated on the drawings or not.
7. Exposed wall outlet boxes shall be erected neatly and tight against the walls and securely anchored to same.
8. All wall outlets of each type shall be set accurately at the same level on each floor, except where otherwise specified or directed. Where special conditions occur, outlets shall be located as directed.
9. 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
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
10. Outlet boxes shall be of approved design and construction; of form and dimensions suited and adapted to its specific location; the kind of fixture to be used and the number and arrangements of conduits, etc., connecting therewith. All ferrous outlet boxes shall meet the requirements for zinc coating as specified under Electrical Conduit Systems.
11. There shall be knockouts opened only for the insertion of conduit. Any outlet boxes with more openings than are necessary for conduit insertion, shall be sealed by the Contractor without additional charge.
12. All outlet boxes and junction boxes for exposed work shall be galvanized cast iron or cast aluminum with threaded openings. Outlet boxes for exposed inside work in damp locations shall be galvanized cast iron or cast aluminum with threaded hubs and neoprene gaskets.
13. Junction boxes shall not be less than 4 11/16" square and shall be equipped with zinc coated plates. Where plates are exposed they shall be finished to match the room decor.
14. FIXTURE SUPPORTS - Outlet boxes supporting lighting fixtures shall be equipped with fixture studs held by approved galvanized stove bolts or integral with the box. Cast iron or malleable boxes shall have four (4) tapped holes for mounting required cover or fixtures.
15. Outlet boxes exposed to the weather or indicated W.P., shall be cast iron or cast aluminum and the covers made watertight with neoprene gaskets. The boxes shall have external lugs for mounting. Drilling of the body of the fitting for mounting will not be permitted. The cover screws shall be appropriate in size, noncorrodible and not less than four (4) in number for each box opening.

PART E - ELECTRICAL WIRING DEVICES (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

- A. WALL SWITCHES shall be of the best specification grade, quiet type, and shall have a rating of 20 Amperes at 277 volts, as manufactured by Bryant, Hubbell or approved equal. The mechanism shall be equipped with arc snuffers. They shall be of the tumbler type, single pole. Switches of the 3-way type shall have a similar rating.
- B. RECEPTACLES
1. CONVENIENCE OUTLETS - shall be of the best specification grade, duplex, two-pole, 3-wire, 15 Amperes at 125 volts. It shall have a grounding pole that shall be grounded to the conduit system. Receptacles shall be capable of both back and side wiring and shall have only one (1) grounding screw. Receptacles shall be Hubbell Cat. #5262 or approved equal.
 2. HEAVY DUTY RECEPTACLE OUTLETS - shall have the Ampere rating and the number of poles specified on the Contract Drawings and shall be Hubbell, Russell-Stoll, Bryant, AH & H or approved equal. Each outlet shall have a grounding pole, which shall be grounded to the conduit system.
 3. FLOOR RECEPTACLES - shall 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 shall 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 shall be in a gasketed, cast iron enclosure.
- E. PLATES
1. Every convenience outlet and switch outlet shall 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 shall be used. Where more than three (3) switches are located at one (1) point, the faceplates may be made up in multiple units.

PART F - ELECTRICAL CONDUCTORS AND TERMINATIONS (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

- A. CONDUCTORS FOR LIGHT AND POWER - All wire and cable shall be of annealed copper of 98% conductivity. Aluminum wire or cable will not be permitted. The insulation shall be flame retardant, moisture and heat resistant, thermoplastic, type THW or THWN rated for 600 volts at 75 degrees C. for both wet and dry locations. Wires No. 8 or larger shall be stranded. Wires and cables shall also be subject to the requirements of the NYCEC. Cables for incoming service or wire in conduits contiguous with the earth or in concrete or other damp or wet locations shall be synthetic rubber insulated with neoprene jacket, heat and moisture resistant and shall 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 shall 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 detailed

Specifications of applicable Contracts.

- D. MINIMUM SIZE - Conductors smaller than No. 12 AWG shall not be used for light or power.
- E. COLOR CODE - Wires shall have a phase color code, and multiple conductor cables shall be color coded.
- F. CABLE DATA - The Contractor shall 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 shall be delivered to the site of the work on original sealed factory reels.
- H. TESTS
 - 1. NOTIFICATION OF TEST - No cable shall be released for shipment from the mill unless authorized by the Commissioner. The Contractor shall give the Commissioner at least 10 days notice when the cable will be available for testing at the mill. The Contractor's representative or inspector shall have access during working hours to all parts of the plant where the cable is being manufactured, and all reasonable inspection and testing facilities shall be afforded to the Contractor without increase in price to the City. The Inspector shall witness the complete test of cable and receive a copy of all test data.
 - 2. TEST DATA - The Contractor shall forward to the Commissioner six (6) copies of all test data for approval before accepting shipment of the cable.
 - 3. INSPECTION DURING MANUFACTURE - The Commissioner reserves the right to dispatch a representative to the factory at any time during the period of manufacture of the cable for the purpose of expediting or checking progress. The living and traveling expenses of the City Engineers making these inspections and witness tests will be borne by the City of New York.
 - 4. TEST IN CITY LABORATORY - Sufficient additional length of conductor shall be provided on each reel, so that a six (6) foot sample may be removed for testing in the City's Laboratories. This sample shall be cut from the reel in the presence of the Inspector of the Department of Design and Construction and cut in two (2) three-foot lengths, each piece to be tagged showing reel number, size and type, manufacture, date, name or project & Contract number. Samples shall be handed to the Inspector for transmittal. If it is found as the result of test that the cable does not comply with the approved factory test the Contractor will be ordered to remove all cable which came off the reel and has been installed, and to replace the defective cable not used, without cost to the City. The Contractor will be held responsible for any delays in the construction program caused by the defective cable.
 - 5. FINAL FIELD TEST - After conductors are installed and connected, the City will test the work for overall insulation resistance. The Contractor shall furnish all test equipment necessary. To be acceptable, the test shall meet the requirements set forth in the NYCEC.
- I. WIRE INSTALLATION
 - 1. INSTALL WIRES AFTER PLASTERING - Feeder and branch circuits wiring shall not be installed in conduit before the rough plastering work is completed. No conductors shall be pulled into floor conduits before floor is poured.

2. **CONDUIT SECURED IN PLACE** - No conductor shall 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 shall be left with sufficiently long ends for proper connection and stowing.
4. **PULLING COMPOUNDS** - When required to ease the pulling-in of wires into conduit, only approved compounds as recommended by cable manufacturers shall be used.
5. **PRESSURE CONNECTORS** - for wires shall be of the cast copper or forged copper pressure plate type. Connectors shall be O.Z., Burndy, National Electric Products or approved equal.
6. Splices and feeder taps in the gutters of panel boxes shall 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, shall 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 shall be as approved by the connector manufacturer.
 - b. For wire and cable No. 6 AWG and larger for branch circuit wiring the seamless tubular connector will only be accepted. Application of this connector shall be with a tool recommended by the connector manufacturer.
9. **TAGS** - All feeders and risers shall be tagged at both ends, and in all pull and junction boxes and gutter spaces through which they pass. Such tags shall be of fiber and have the feeder designation and size stamped thereon.
10. **BRANCH CIRCUIT WIRING**
 - a. The Contractor installing branch circuit wiring shall test the work for correct connections and leave all loop splices in the fixture outlet boxes properly spliced and taped. The Contractor shall provide wire ends long enough for convenient connection to device.
 - b. **NEUTRALS** - No common neutrals shall be used except for lighting branch circuits. Each neutral wire shall be terminated separately on a neutral busbar in the panelboard. No common neutrals will be permitted for convenience receptacle branch circuits.

J. TERMINATIONS

1. **LUGS** - All lugs for all devices and all cable terminations shall 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 manufacture. Lugs for No. 6 AWG cable and larger shall be cast copper or forged copper pressure plate type. Lugs for 1/0 and larger shall be fastened with two (2) bolts.
2. All lugs shall be of the proper size to accept the cable connected to them. Any Contractor furnishing a device containing lugs is to coordinate with the Electrical Work Contract Documents to insure 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. This requirement

applies to both the Contractor for Electrical Work whose branch circuit protector must have lugs of the proper size, as well as to the Contractor who furnishes the device who may have to increase the size of that particular device.

PART G - CIRCUIT PROTECTIVE DEVICES (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

SCOPE - This Section sets forth the circuit protective devices such as circuit breakers and safety switches, used in connection with Motor Control Equipment, Distribution Centers, Panelboards and Service Entrance.

A. CIRCUIT BREAKERS

1. **CIRCUIT BREAKERS** shall be operable in any position and shall be of the quick-make, quick-break type on manual operation. The handle shall 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 shall be provided, in addition to the "On" and "Off" indication. All circuit breakers shall be of the bolted type.
2. **TRIP RATING** - Circuit breakers shall 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 BARRIERS** - Multipole pole breakers shall be designed to break all poles simultaneously. They shall be provided with barriers between poles and arc suppressing devices.
4. **ELEMENTS** - Multipole circuit breakers shall have frames of not less than a 100 Ampere rating. Multipole circuit breakers for 480 volts AC operation shall have an NEMA interrupting rating of 18,000 Amperes, unless a higher rating is specified in the Specific Requirements 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 shall be provided with interchangeable trip elements, which can be replaced readily.
6. The trip rating of all circuit breakers shall not exceed 70% of frame rating.
7. Single pole circuit breakers for branch circuits shall have a frame size of no less than 100 Amperes, and shall be rated at 125 volt A.C. with a NEMA interrupting rating of 10,000 Amperes, unless a higher rating is specified in the Specific Requirements or indicated on the Contract Drawings.
8. **INVERSE TIME ACTION** - The circuit breakers shall 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, the other with instantaneous trip action. Inverse time delay action shall 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.
9. **CONSTANCY OF CALIBRATION** - The tripping elements shall insure constant calibration and be capable of withstanding excessive short circuit conditions without injury.
10. **CONTACTS** shall be non-welding under operating conditions and of the silver to silver type.
11. **TEMPERATURE RISE** - Current carrying parts, except thermal elements shall not rise in temperature in excess of 30 degrees C. while carrying rated current at rated frequency.
12. **NUMBERING** - Each circuit breaker shall be distinctly numbered when installed in a group with other breakers. The calibration of trip element shall 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 shall be of the type HD of a rating not less than 30 Amperes. Enclosures shall be provided with means for locking. For ratings above 60 Amperes terminals shall have double studs.

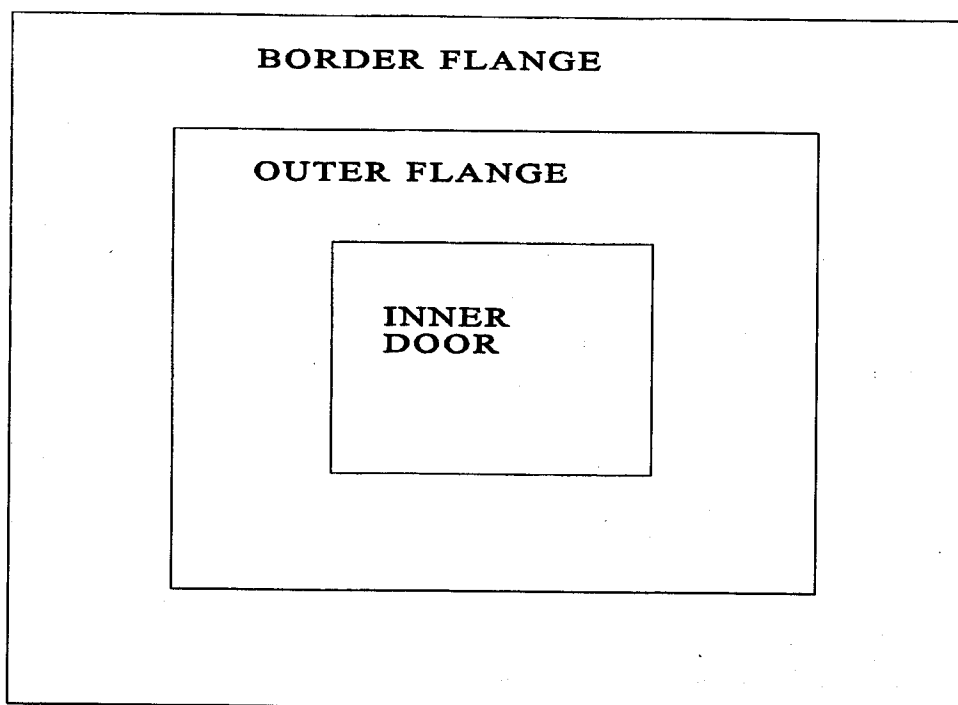
PART H - DISTRIBUTION CENTERS (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

SCOPE - This Section sets forth the construction and installation procedure for Switchboards, Panelboards and Cabinets.

- A. **PANELBOARDS--GENERAL TYPE** - The panelboards shall be of the automatic circuit breaker type with individual breakers for each circuit, removable without disturbing the other units. Circuit breakers shall be in accordance with the requirements outlined under "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 shall be distinctly numbered.
- C. **BUS-BAR CONSTRUCTION AND SUPPORT** - Panel Boards shall be of the deadfront type and shall have bus bars and branch circuits designed to suit the system and voltage. Current carrying parts, exclusive of circuit breakers shall be copper and based on a maximum density of 1,000 Amperes per square inch. Bus bars for the main switchboard shall be designed for the frame rating of the Service Breaker. Bus bars shall run up the center of the panel, unless otherwise indicated, and shall have connected thereto the various branch circuits. Unless otherwise specified, bus bars for each panelboard shall be equipped with main lugs only and capacity as required on Contract Drawings. Where main protection is required, automatic circuit breakers shall be used. A neutral bus of at least the same capacity as a live bus bar shall be provided for the connection of all neutral conductors. Each terminal shall be identified. All current carrying parts, exclusive of circuit breakers, shall be of copper with a minimum number of joints. The bus bar structure shall be a self supporting unit, firmly fastened to a ½ inch plastic board, extending the full length and width of assembly which shall 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 shall separate neutral bus from other parts of panel.
- D. **CIRCUIT BREAKER ASSEMBLY** - The entire circuit breaker and bus bar assembly shall be mounted on an adjustable metal base or pan and secured to the back of panel box. The panel shall have edges flanged for rigidity.
- E. **PANEL MOUNTING** - The panel shall be centered in the panel box to line up with door openings and set level and plumb so that no live parts are exposed with the door open.
- F. **PANEL CABINET CONSTRUCTION AND SUPPORT**
 - 1. Panel boxes shall be fabricated from No. 12 USSG sheet steel of no more than three-piece construction, reinforced at the corners and with continuous welds. Boxes having a back whose area is larger than 16 square feet, shall be of No. 10 USSG sheet steel and reinforced to provide ample stiffness and to prevent buckling. Boxes shall be of sufficient size to afford a clear gutter space on all sides, of not less than six (6) inches.
 - 2. **PANEL CABINET INSTALLATION** - When installed surface, or in panel closets, they shall be mounted on Kindorf channel, supported from floor slab to ceiling slab.
 - 3. Where cabinets cannot be set entirely flush due to shallow walls or partitions or where cabinet is extra deep, the protruding sides of cabinet shall 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. **CABINET TRIM** - Trim for both lighting and power panelboards shall be door-in-door type installation as depicted in **DETAIL A TRIM FOR LIGHTING AND POWER PANELBOARDS**. Construction details are to be as described in the following paragraphs.



DETAIL A TRIM FOR LIGHTING AND POWER PANELBOARD

1. **CABINET TRIM** - The trim and doors for lighting and power panels shall be made of No. 12 USSG full finish sheet steel in one (1) piece. Cabinet trim larger than 16 square feet shall be made of No. 10 USSG. The inner door shall cover the circuit breaker section only and be provided with appropriate brass hinges. The outer door shall cover the entire gutter space and shall be attached to the border type flange with appropriate hinges. Both doors for power panels shall be provided with a New York City Lock No. 511S, with key change to No. 47 and two (2) keys. For lighting panels, the inner door shall be provided with a substantial catch. All hinges shall be of the concealed type. Locks shall be flush with trim. In addition, for panels requiring doors over 48 inches in height, furnish a vault handle and a 3-point catch arranged to fasten door at top, bottom and center.
 2. The door shall close against a flange or rabbet to afford a dust tight fit. All space between the panel and the cabinet trim shall be closed by means of a sectional plate secured to the trim.
 3. The border flange of the trim shall be fastened to the box with oval head screws finished to prevent corrosion or with approved trim clamps.
 4. To facilitate installation of trim, a suitable angle iron shall be spot welded across the bottom of each trim to carry the weight of the trim while the holding screws are being put in place.
- H. **MOTOR CONTROL CENTERS** - Motor centers shall be furnished by the Contractor as indicated in the Specifications or Contract Drawings, but shall be installed by the Contractor for Electrical Work.
- I. **NAMEPLATES** - Nameplates where required, shall be made of engraved Lamicoid sheet, or approved

equal. Letters and numbers shall be engraved white on a black background (except for Firehouse projects which shall have white letters on a red background) the Contractor shall submit an engraved sample for approval as to design and style of lettering before proceeding with the manufacture of the nameplate. Nameplates shall be of suitable size and shall 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 shall also be provided for each distribution circuit breaker giving the breaker number, the number of the feeder, and the name of the equipment fed.

- J. SHOP DRAWINGS - showing all details of boxes, panels, etc., shall be submitted for approval.
- K. DIRECTORIES - A directory shall 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 or approved equal that is not less than 1/16 inch thick over cardboard or heavy paper. The directory shall be typewritten and show the number of each circuit, the name of circuit and lighting or equipment supplied. The size of riser feeder shall be as indicated on directory. The dimensions of directory shall be submitted for approval for each size of panel.
- L. CONSTRUCTION
 - 1. FINISH - Panel boxes, doors and trim for installation in dry locations, shall be zinc coated after fabrication by the hot-dip galvanizing or electroplate process on inside and outside surfaces. In damp locations, panelboards shall be enclosed and gasketed NEMA 3R type. Panelboards located outdoors or exposed to the weather shall be cast iron.
 - 2. PAINTING - Panel boxes, doors and trim shall receive a coat of approved priming paint and a second coat of approved paint in the field after installation. Paint shall be applied to the inside and outside of boxes and on both sides of trim. Panel trims and doors shall 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. All of the aforementioned painting is to be done by the Contractor who furnishes the boxes and trim. Where panel trims or boxes are installed on walls which are to be painted, the previously mentioned third or finishing coat of paint shall be included in the work of the Contractor who has the Contract for general interior painting.

PART I - MOTORS (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

SCOPE - This Section sets forth the general design, construction and performance requirements, which shall apply to all motors furnished in any of the Contracts.

- A. MOTOR DESIGN - All motors shall be designed to comply with the New York State Energy Code currently in effect. Motors shall have standard NEMA frames and shall have nameplate ratings adequate to meet the specified conditions of operation. Motor performance under variable conditions of voltage and frequency shall be within the limits set in NEMA standards, unless modified in present Specifications. Motors shall be expressly designed for the hazard duty load, voltage and frequency as specified in the Contract. All motor windings shall be copper. All motors intended to operate on a 208 volt system shall be designed and rated for 200 volts.
- B. MOTORS OF SAME MANUFACTURER - Unless expressly permitted otherwise by the Commissioner, all motors under the same Contract shall be manufactured by the same company. Exceptions may be granted in the case of motors of 1/4 horsepower rating and smaller, or for a motor that is an integral part of the equipment, with its housing especially built for this purpose.
- C. STANDARDS OF COMPARISON - In general, the best standard products of the leading motor manufacturers shall be considered as a standard for comparison. The requirements of the NEMA standards for motors and generators shall be deemed to contain the minimum requirements of performance and design.
- D. 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 Building Code of the City of New York may be performed as directed by the Commissioner. Such motors shall bear a nameplate lettered "Quiet Motor." Springs and slip rings shall be of approved non-ferrous material.

E. BEARINGS

1. Bearings, unless specified otherwise, shall be of the ball or roller type. Motors one (1) horsepower and larger that are equipped with ball roller bearings shall also have lubrication of the pressure-relief greasing type. Each Contractor who furnishes four (4) or more such motors shall also furnish, as part of its Contract, a pressure grease gun of rugged design, of approximately 10 ounce capacity, complete with necessary adapters. The Contractor shall also provide 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 shall in addition to having protected accessible fittings for oiling be provided with visible means for determining normal oil level. Lubrication shall be positive, automatic and continuous.

F. MOTOR TERMINALS AND BOXES - Each motor shall 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 shall be furnished of ample size to make and house motor connections. These requirements shall be met irrespective of any other standards or practices. Size of cable terminals and conduit terminal box holes shall be subject to approval. For motors five (5) horsepower or larger, each terminal shall 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 shall be of cast iron with threaded hubs and gasketed covers. Cover screws shall be of non-corrosive material.

G. MOTOR TEMPERATURE RISES - The motor nameplate temperature rises for the various types of motor enclosures shall 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 shall meet the requirements of NEMA standards for the size and type of the motors. Tests for heating shall 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.

H. SPECIAL CODE INSTALLATIONS - Electrical installations covered by special publications of NBFU and by special City rulings and regulations shall comply in design and safety features with such applicable codes, regulations and rulings, and shall be furnished and installed complete with all accessories and safety devices as therein specified.

I. MOTORS ON LIGHTING PANELS - The largest A.C. motor permitted on branch circuits of lighting panels shall not exceed 1/4 horsepower.

J. MOTORS RATED 1/2 horsepower and larger shall be polyphase.

K. TESTS

1. **FACTORY INSPECTION** - Electrical equipment and devices (except portable) not covered by standard Specifications or tests herein prescribed shall be inspected and witnessed on test at the factory with the tested equipment being completely assembled and connected under conditions approved by the Commissioner as equivalent to the actual working conditions. Suitability and

ruggedness of the design for the specified purpose will be a condition for acceptance.

2. **SHOP TESTS** - to determine the load performance of motors shall be made in accordance with Standard C-50, of the ASA. Motors shall meet the requirements of C-50 for insulation resistance, dielectric strength, efficiency and temperature rise. Efficiency (and power factor for A.C. motors) shall be established for 50, 75 and 100 percent of rated horsepower but for motors of 100 horsepower or larger, the 125 percent loading shall be included.
3. **TEST REPORTS** - The result of shop tests shall be submitted to the Commissioner for approval and shall be on forms approved by the City. The evaluated test data shall include a signed statement confirming the fact that the equipment meets the requirements of the standards of performance.
4. **MANNER OF TEST** - For motors of 100 horsepower or smaller, check tests against complete tests of similar motors will be accepted. For motors larger than 100-horsepower, complete tests for each motor furnished shall be made, and certified test data sheets shall be submitted for approval, unless shop tests are required by the Detailed Specifications.
5. **PREFERRED METHODS** - The efficiency of fractional horsepower motors shall be determined by the input-output method; for larger motors up to and including 100 horsepower, the separate loss method as specified in ASA Standards C-50 will be accepted unless otherwise required in the Specifications.

L. **SPARE PARTS** - The Contractor who furnishes motors, including fractional horsepower, shall provide the following spare parts and accessories in connection therewith:

1. **BRUSHES** - One (1) additional set of brushes for each motor equipped with them.
2. **BEARINGS** - For each group of three (3) and fraction thereof, of each type and size of motor, the Contractor shall furnish one (1) set of extra bearing linings or ball or roller bearings. Where less than three (3) of any type of motor is involved, one (1) set of extra bearings shall be furnished.
3. **SPRINGS** - One (1) set of brush springs used in slip ring motor or universal type motors.
4. **WRAPPER MARKING** - All parts shall be delivered neatly and securely wrapped and boxed, plainly tagged and marked for identification and reordering.

PART J - MOTOR CONTROL EQUIPMENT (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

SCOPE - This Section sets forth the requirements for motor controllers and associated devices, which are applicable to all Contracts under which motor control equipment is furnished or installed.

- A. **MANUFACTURER** - All control equipment furnished under one (1) Contract shall 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 who furnishes a motor shall 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 breaker, magnetic starter 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 shall furnish as many of these items as are 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 who furnishes the motor shall 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 30 horsepower shall have magnetic across the line starters; motors rated above 30 horsepower shall be furnished with reduced voltage (autotransformer type) starter or part winding start with time delay to reduce inrush current. Size of starters shall be based on 200V. operation.
2. SLIP RING - A.C. Motors of the slip-ring type shall be furnished with primary across the line starters interlocked with secondary starting and regulating equipment. The interlocking feature shall 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 $\frac{1}{2}$ horsepower or more, magnetic starters and circuit breakers shall be used. Single phase A.C. motors smaller than $\frac{1}{2}$ 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 $\frac{1}{2}$ horsepower. Means for manual operation shall be provided.

D. DISCONNECTING BREAKER - All motor starters, unless otherwise specified shall be provided with a disconnecting means in the form of a circuit breaker of the type specified under "CIRCUIT PROTECTIVE DEVICES" of the General Conditions. This disconnecting means shall be contained in the same housing with the starter and shall be operable from outside. Means shall 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 shall 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 shall be provided.

G. 1. PANELS - Motor control devices and appliances shall be mounted on approved insulating slabs with all wiring and connections made on the back of the slabs.

2. WIRING AND TERMINALS - Wiring connections for currents of 100 Amperes or less may be made with copper wire or cable with special flameproof insulating coverings. Such wires shall be installed in a neat workmanlike manner, flat against the slab, and held in place by clips. Connections shall 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 shall 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.

3. COPPER BUS - For currents exceeding 100 Amperes, copper bus shall be used in place of wires. The bus shall 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 shall provide sufficient areas to keep current density at not more than 1,000 Amperes per square inch.

H. COOPERATION - The Contractors who furnish electrically operated equipment shall give to the Contractor for Electrical Work full information relative to sizes and locations of apparatus furnished by them which require electrical connections.

Equipment being installed by the Contractor for Electrical Work shall be delivered to the Contractor for Electrical Work by other Contractors in proper time and sequence so that the Contractor for Electrical Work shall be able to meet the Contractor for Electrical Work working schedule.

I. SPARE PARTS

1. **FURNISH** - Each Contractor shall furnish the following spare parts pertaining to equipment furnished by each Contractor.

One (1) set of contact fingers and springs and thermal elements for each three (3) (or fraction) of each size of magnetic contactor starter.

One (1) holding coil for each three (3) (or fraction) of each size of magnetic contactor starter.

2. **WRAPPER MARKING** - All parts shall be delivered to the Resident Engineer neatly wrapped and boxed and plainly tagged and marked for identification and reordering.

PART K - SCHEDULE OF ELECTRICAL EQUIPMENT

Schedule D requirements for electrical motor equipment may be included in one or more of the Specifications for the separate contracts for the Project. SCHEDULE D delineates the responsibilities of each separate contractor for electrical motor control equipment. SCHEDULE D is included in the Addendum to the General Conditions. In the event of any conflict between the Specifications and SCHEDULE D, SCHEDULE D shall 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 shall have no effect and the Contractor's obligation with respect to the electrical motor control equipment, as set forth in the Specifications, shall remain in full force and effect.

1.38 Safety

- A. Each Contractor shall provide and maintain all necessary temporary closures, guard rails, and barricades to adequately protect all workers and the public from possible injury. Any Contractor requiring removal of these items shall be responsible for the replacement of same.

1.39 Interruption of Services and of Project Facilities

- A. **EVENING AND WEEKEND WORK** - Where the work makes temporary shutdowns of the services unavoidable, they shall be made at night or on weekends or at such times that will cause no interferences with the established routines and operations of the projects in question.

1. Where weekend or evening work is required due to unavoidable service shutdowns, such work shall be performed at no extra cost to the City.

B. INTERRUPTION OF PROJECT FACILITIES

1. The Contractor shall not interrupt any of the services of the project nor interfere with these in any way without the permission of the Commissioner. Such interruption, or interferences, shall be made as brief as possible, and only at such time stated.
2. Under no circumstances will the Contractor, or its workers, be permitted to use any part of the project as a shop, without the permission of the Commissioner.
3. Unnecessary noise shall be avoided at all times and necessary noise shall be reduced to a minimum.
4. The facility operates 24 hours per day seven (7) days a week. Toilet facilities, water and electricity

must be operational at all times. No services of the project can be interrupted in any way without the permission of the Commissioner. Careful coordination of all work with the Resident Engineer must be done to maintain the operational level of the project personnel.

5. Contractors shall schedule their work to avoid noise interference that will affect the normal functions of the project. In particular, construction operations producing noises that are objectionable to the project functions will be scheduled at times of day or night, day of the week, or weekend, which will not interfere with the project personnel. Any additional cost resulting from this scheduling shall be borne by the specific Contractor.
6. The Contractor shall arrange to work continuously, including overtime, if required, to assure that services will be shut down only during the time actually required to make the necessary connections to the existing work.
7. The Contractor shall give ample written notice in advance to the Commissioner and project personnel of any required shutdown.

1.40 Separation of Work Between Trades (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

- A. SCHEDULE E – Requirements for various items of work are included in the Specifications for the separate contracts for the Project and in the General Conditions. Schedule E delineates the responsibilities of each separate contractor for various items of work, as well as the extent to which certain items involve coordination between trades. Schedule E is included in the Addendum to the General Conditions. The delineation set forth in Schedule E shall be taken as specific instruction to the Contractor that it is responsible for the listed items of work. Schedule E is not intended to limit the Contractor's responsibility for supervision and coordination as set forth in Paragraph B below. In the event of any conflict between the Specifications, the General Conditions and Schedule E, Schedule E shall take precedence; provided, however, in the event of an omission from Schedule E (i.e., Schedule E omits either a reference to or information concerning an item of work which is set forth in the Specifications or the General Conditions), such omission from Schedule E shall have no effect and the Contractor's obligation to perform the work, as set forth in the Specifications or the General Conditions, shall remain in full force and effect.
- B. SUPERVISION AND COORDINATION - Each Contractor is required to supply all necessary supervision and coordination information to any other trades who are to supply work to accommodate their installations.

1.41 Shop Drawing and Material Samples Schedule

- A. SCHEDULE F – Schedule F sets forth all submittal requirements for shop drawings and material samples. Schedule F is included in the Addendum to the General Conditions. At the kick-off meeting, each Contractor must review this Schedule with the Commissioner's Representative and the Consultant. Within 10 days after the kick-off meeting, the Contractor must complete information on Schedule F concerning the submission date, the required delivery date and the fabrication time. For all required submittals of shop drawings and material samples, the Schedule F provided by the Contractor must indicate a submission date which is at least 20 days prior to the date of the manufacture of the item or materials to be installed. In addition, if so directed by the Commissioner, the Schedule F provided by the Contractor must indicate a submission date for shop drawings and/or material samples of specified items or materials which is within 60 days after the kick-off meeting. In the event of any conflict between the Specifications and Schedule F, Schedule F shall take precedence; provided, however, in the event of an omission from Schedule F (i.e., Schedule F omits either a reference to or information concerning a submittal requirement which is set forth in the Specifications), such omission from Schedule F shall have no effect and the Contractor's submittal obligation, as set forth in the Specifications, shall remain in full force and effect.
- B. COORDINATION - The Resident Engineer for this project will coordinate and review the data submitted by various Contractors. Upon acceptance by the Resident Engineer, the Resident Engineer

will date and sign the schedule as approved and transmit it to the Consultant, Contractors and Project Manager within the Department of Design and Construction.

- C. ARTICLE 11 - Thereafter, this schedule will be subject to the provisions of Article 11 of the agreement and must be strictly adhered to by the Contractor.

1.42 Specific Requirements

- A. The work of this article shall be the responsibility of the Contractor for General Construction Work, unless otherwise indicated.

B. FIELD MEASUREMENTS

1. Each Contractor shall verify all dimensions and conditions on the job so that all work will properly join the existing work.
2. Each Contractor, before commencing work, shall examine all adjoining work on which each Contractor's work is in any way dependent on good workmanship in accordance to the intent of the Specification and Contract Drawings. The Contractor shall report to the Commissioner any condition that will prevent any Contractor from performing work that is below the required standard.

C. BORINGS (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

1. 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:
2. 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 forces of the Department of Design and Construction at the site.
3. SOIL 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.
4. CERTIFICATION OF SAMPLES - The City certifies that the work was carried out as stated, and that the soil samples and rock cores, if any were referred to, were actually taken from the site at the times, places and in the manner indicated. The samples are available for inspection in the Department of Design and Construction Subsurface Exploration Section.
5. 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.
6. 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 and the bidder is required to estimate the influence of such features from its own inspection of the site.

D. DEFERRED CONSTRUCTION

1. Where necessity for deferred construction is certified by the Commissioner, in order to permit the installation of any item or items of equipment required to be furnished and installed under any other Contract in effect concurrent with the time allowed for doing and completing the work of the Contract, the Contractor shall defer construction work limited to adequate areas as approved by

the Commissioner.

2. The Contractor shall confer with the affected Contractors and ascertain arrangements, time and facilities necessary to be made by the Contractor in order to execute the provisions specified herein.

E. WORK FENCE ENCLOSURE (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

1. The Contractor shall furnish and erect a wood fence to the extent shown on the drawings enclosing the entire project on all sides. All materials used shall be new. Any permit required for the installation and use of said fence shall be borne by the Contractor.
2. THE FENCE shall be 7'-0" high with framing construction of yellow pine, using 4" x 4" posts on not more than 6'-0" centers, with three (3) rails of at least 2" x 4" size to which shall be secured boards, 3/4" x 6" tongue and groove, laid solid and surface and double nailed to each bearing. Posts shall be firmly fixed in the ground at least 30" and thoroughly braced. Top edge of fence shall be trimmed with a rabbeted edge mould. Provide on the street traffic sides of fence, observation openings as directed. The Contractor has the option of using 1/2" exterior grade plywood in lieu of the 3/4" x 6" tongue and groove boards.
3. GATES - Provide an adequate number of double gates, complete with hardware, located as approved by the Resident Engineer. Double gates shall have a total clear opening of 14'-0" with two (2) 7'-0" hinged swinging sections. Hanging posts shall be 6" x 6" and shall extend high enough to receive and be provide with tension or sag rods for the swinging sections.
4. PAINTING - The fence and gates shall be entirely painted on the street and public sides with two (2) coats of approved lead and oil paint. The below-grade section of the posts shall be first creosoted or given a coat of tar base paint. Black stenciled signs reading "POST NO BILLS" shall be painted on fence with three (3) inch high letters on 25 foot spacings for the entire length of fence on street traffic sides. Signs shall be stenciled five (5) feet above the sidewalk.
5. It shall be the obligation of the Contractor to remove all posters, advertising signs, and markings, etc., immediately.
6. Where sidewalks are used for "drive over" purposes for Contractor vehicles, a suitable wood mat or pad shall be provided for protection of sidewalks.
7. Where required, make provision for fire hydrants, lampposts, etc.
8. REMOVAL - When directed by the Resident Engineer, the fence shall be removed.

F. PUMPING

1. 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.
2. All pumps shall be maintained at all times in proper working order.

G. RESIDENT ENGINEER'S OFFICE

1. OFFICE SPACE IN EXISTING BUILDING (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)
 - a. The Resident Engineer will arrange for office space for sole use in the building where work is in progress. The Contractor for General Construction Work shall provide and install a lockset

for the door to secure the equipment in the room. The Contractor for General Construction Work shall provide two (2) keys to the Resident Engineer. After completion of the project the Contractor for General Construction Work shall replace the original lockset on the door and ensure its proper operation.

- b. The Contractor for General Construction Work shall provide one (1) telephone, where directed, for the exclusive use of the Resident Engineer. The Contractor for General Construction Work shall pay all costs for telephone service for calls within New York City limits for the duration of the project. The telephone service shall continue for a period of 90 days following substantial completion.
- c. The Contractor for General Construction Work shall provide the following equipment:
 - (1) 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) lockers, metal olive green or gray, 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 1/2"D x 18"W in a grey finish by Art Steel No. 2904L or approved equal.
 - (2) One (1) 9000 B.T.U. air conditioner or as directed by Commissioner. Wiring for the air conditioner shall be minimum No. 12 AWG fed from individual circuits in the fuse box.
 - (3) Two (2) metal wastebaskets, 13 inches square 15 inches high with rubber feet and corners by Art Metal Company No. 168 or approved equal.
 - (4) One (1) fire extinguisher one (1) quart vaporizing liquid type, brass, wall mounted by Pyrene No. C21 or approved equal.
 - (5) 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.

2. TRAILER OFFICE (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

- a. The Contractor for General Construction Work shall provide at its own cost and expense a trailer and install and connect all utility services to trailer within twenty (20) days of start of work. The trailer shall have equipment having the minimum requirements hereinafter specified. Any permit required for the installation and use of said trailer shall be borne by the Contractor.
- b. The trailer shall remain the property of the Contractor for General Construction Work except that the file cabinets herein specified, shall become the property of the City of New York.
- c. Trailer shall be office type trailer of the following general minimum dimensions:
 - 1. Length, overall: 35 feet.
 - 2. Length, inside: 32 feet.
 - 3. Width, overall: 8 feet.
 - 4. Width, inside: 7 feet, 5 inches.
- d. Trailer shall be manufactured by International Trailer Company, Model No. 1 MU-35-D or Atlantic Trailer Corporation, Model No. F-36 or approved equal.
- e. The exterior of the trailer and the wheels shall be given an approved coat of exterior enamel. The enamel finish coat shall be DUPONT orange lacquer or approved equal. The trailer shall 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 STRUCTURES	3-1/2"
RESIDENT ENGINEER'S OFFICE	2-1/2"

NOTE: In lieu of painting letters on trailer the Contractor for General Construction Work may substitute a sign constructed of a good quality lumber with the same type and size of lettering above.

- f. All windows and doors shall have insect aluminum screens and wire mesh protective screening.
- g. The interior shall be finished in 1/4 inch plywood. Plywood shall be finished in natural color, with two (2) coats of varnish or lacquer.
- h. The interior shall be divided by partitions into one (1) large room in front of trailer, and a private office approximately 6' x 7' at rear of trailer and a washroom located adjacent to the private office.
- i. The washroom shall be equipped with a flush toilet, wash basin with two (2) faucets, medicine cabinet, complete with supplies by Hospital Supply and Watters Labs., Inc., Model No. 1 or approved equal and a toilet roll tissue holder. Plumbing and fixtures shall 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 shall be furnished.
- j. The heating system shall consist of thermostatically controlled electric baseboard heaters capable of delivering not less than 30,000 BTU per hour and heaters shall be as manufactured by Chromalox or approved equal, sized per area with individual approved thermostats.
- k. The trailer shall be equipped with an approved two-circuit, 110-120 volt armored cable wiring system of adequate capacity complete with entrance connector with provision for grounding, enclosed fused service switch and branch circuit fuse box. The circuits for lighting, water heater, heater and convenience outlets, etc. shall be two-conductor, No. 12. The circuits for the space heaters shall be sized minimum No. 12 wire led from individual circuits in the branch circuit fuse box. Metal boxes shall be provided at all outlet points. All wiring shall conform to the requirements of the Electrical Code of the City of New York for armored cable wiring systems.
- l. Lighting to be furnished by a minimum of four (4) 48 inch, single tube, fluorescent fixtures for the large rooms and an incandescent fixture for the washroom. Lighting fixtures shall be provided with built-in pull-chain switches. A minimum of six (6) duplex convenience outlets shall be installed; four (4) in the larger room and two (2) in the smaller room. These outlets shall be in addition to connections for electric space heaters and heaters for domestic hot water.
- m. In addition to the washroom and private office, the following shall be built-in to the trailer:
 - 1. The drafting or reference table at least 60 inches long by 36 inches wide with cabinet below, head shelf at each end of the trailer, wall type plan rack at least 42 inches wide and wardrobe opposite washroom.
- n. The following movable equipment shall be furnished:
 - 1. Four (4) single pedestal desks, 42" x 32"; two (2) swivel chairs with arms and three (3) side chairs without arms to match desk. Four (4) lockers, metal olive green or gray, 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 1/2" D x 18"W in a grey finish by Art Steel No. 2904L or approved equal.
 - 2. One (1) 6000 B.T.U. and one (1) 9000 B.T.U. air conditioner. Wiring for the air conditioners shall be minimum No. 12 AWG fed from individual circuits in the fuse box.

3. Two (2) metal wastebaskets, olive green or grey finish, 13 inches square 15 inches high with rubber feet and corners by Art Metal Company No. 168 or approved equal.
 4. One (1) fire extinguisher one (1) quart vaporizing liquid type, brass, wall mounted by Pyrene No. C21 or approved equal.
 5. 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.
- o. TRAILER TEMPORARY SERVICE - Plumbing and electrical work required for the trailer will be furnished and maintained as below.
1. PLUMBING WORK - shall include all water supply and drainage piping required for a complete installation. Contractor to provide a temporary water service from the City's water main and extend in the trailer and properly connect up all fixtures requiring water supply. Provide all necessary soil, waste, vent and drainage piping.
 - a. Plumbing Contractor to frost-proof all water pipes to prevent freezing.
 - b. REPAIRS, MAINTENANCE - The Plumbing Contractor provide repairs when and as required for a period of thirty (30) days after the date of substantial completion acceptance.
 - c. DISPOSITION OF PLUMBING WORK - At the expiration of the time limit set forth in Subparagraph 3, the water drainage connections and piping to the office trailer shall be removed and shall be plugged at the mains. All piping shall become the property of the Contractor for Plumbing Work and shall be removed from the site, all as directed. All repair work due to these removals shall be the responsibility of the Contractor for General Construction Work.
 2. ELECTRICAL WORK - The Contractor for Electrical Work shall furnish, install and maintain a temporary electric feeder to the trailer to be used by the Resident Engineer immediately after it is placed at the job site.
 - a. The temporary electric feeder shall be at least three (3) No. 6RH wire and shall be protected by a 60 Ampere fused safety switch, complying with codes and utility requirements having jurisdiction.
 - b. Make all arrangements and pay all costs to provide electric service.
 - c. 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 a period of thirty (30) days after the date of substantial completion acceptance.
 - d. Disposition of Electric Work: At the expiration of the time limit set forth, the temporary feeder, safety switch, etc., shall be removed and disposed of as directed.
 - e. All repair work due to these removals shall be the responsibility of the Contractor.
- p. MAINTENANCE
1. The Contractor for General Construction Work shall provide and pay all costs for hot and cold water, heat and fuel and regular daily janitor service. Furnish toilet paper, cloth towels and soap and maintain the field office in first-class condition, including all repairs, until 30 days after the date of substantial completion acceptance.
 2. Provide fire, extended coverage and vandalism, malicious mischief and burglary and theft

insurance coverage for the Resident Engineer's field office equipment in the amount of \$10,000. All insurance coverage shall be provided by a company licensed and authorized to do business in the State of New York. Such coverage must, under the loss payable clause or by endorsement thereon, state the following: "loss, if any, payable to the City of New York."

3. At 30 days after the date of substantial completion acceptance, or sooner as directed by the Commissioner, the Contractor for General Construction Work shall have all services disconnected and capped to the satisfaction of the Resident Engineer.
- q. The Contractor for General Construction Work shall provide and pay all costs for the following telephone services for the Resident Engineer's trailer:
 1. Two (2) desk phones
 2. One (1) wall phone (with six (6) foot extension cord) at plan table.
 3. A remote bell located on outside of trailer
 4. The telephone service shall continue for a period of 90 days following substantial completion.
- r. Should it become necessary to relocate the trailer or move the field office from one (1) location to another, Contractor for General Construction Work shall be responsible for move or moves and of reconnecting all utilities described above at new location, and shall assume all costs incurred.
- s. PERMITS - The Contractor for General Construction Work shall make the necessary arrangements and obtain all permits required for this work.
- t. The Contractor for General Construction Work has the option of providing, at its cost and expense, rented office or store space in lieu of trailer. Said space shall be in the immediate area of the Project and have adequate plumbing, heating and electrical facilities. Space chosen by the Contractor for General Construction Work must be approved by the Commissioner before the area is rented. All insurance maintenance and equipment required for trailer field office shall also apply to rented spaces.

H. ADDITIONAL EQUIPMENT FOR THE RESIDENT ENGINEER (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

1. The Contractor for General Construction Work shall supply photo equipment not to exceed \$250. Said equipment to be specified by Resident Engineer. At the completion of the project, the equipment shall become the property of the City of New York.
2. The Contractor for General Construction Work shall provide a copy machine for paper sizes 8½ x 11 & 8½ x 14. Copier shall remain at job site 30 days beyond the Substantial Completion date.
3. The Contractor for General Construction Work shall furnish a fax machine and a telephone answering machine at commencement of the project. All materials shall be new, sealed in manufacturer's original packaging and shall have manufacturers' warranties. All items shall remain the property of the City of New York at the completion of the project.
4. Computer Workstation (Refer to the Addendum to the General Conditions for the number of Computer Workstations to be provided):

Computers shall be provided for all contracts that have a total duration of 180 Consecutive Calendar Days (CCDs) or more, as set forth in Schedule "A". Contracts that have a total duration of less than 180 CCDs shall not require computers. Computer workstations shall be provided for

the duration of the contract.

(1) Personal Computer(s) - Workstation Configuration.

- (a) Make and Model: Dell, Gateway, Toshiba, HP, IBM, or an approved equal. (Note: an approved equal requires written approval of the Assistant Commissioner of ITS.)
- (b) Processor: 3.0 GHz Pentium 4 or faster computer - Single Processor.
- (c) System RAM: Minimum of 1 GB (Gigabytes) of SDRAM or DDR.
- (d) Hard Disk Drive(s): 80 GB (Gigabytes) or larger.
- (e) CD-RW: Internal CD-RW, 48x Speed or faster.
- (f) 16xDVD+/RW: DVD Burner (with double layer write capability) 16x Speed or faster
- (g) I/O Ports: Must have at least one (1) Serial Port one, (1) Parallel Port, 2 USB Ports. Serial Ports must consist of UART 16550 Chip or better.
- (h) Video Display Card: PCI Interface with a minimum of 64 MB of RAM.
- (i) Monitor: 17" TFT LCD monitor.
- (j) Available Exp. Slots: System as configured above shall have at least two (2) full size PCI Slots available.
- (k) Fax/Modem: Internal Fax/Modem 56 Kbps speed, featuring 3COM or US Robotics Chipset and supporting a minimum of V.92 and MNP5 compliant. Integrated 10/100/1000 Ethernet.
- (l) Other Peripherals: Optical scroll Mouse, 101 Key Keyboard, Mouse Pad and all necessary cables.
- (m) Software Requirements: Microsoft Windows XP Professional, Microsoft Office 2003 Professional, Microsoft Project 2002 Professional, Adobe Acrobat reader, Anti-Virus software package with one year updates subscription, Win Zip and Auto Cad 2008 LT.

(2) All field offices requiring computers shall be provided with the following:

- (a) One (1) broad-band internet service account. This account will be active for the life of the project.
 - (b) One (1) 600 DPI HP Laser Jet Printer (twelve (12) pages per minute or faster) with one (1) Extra Paper Tray (Legal Size)
 - (c) All necessary Cabling
 - (d) Storage Boxes for and Blank CDs/DVDs
 - (e) Printer Table
 - (f) UPS/Surge Suppressor combo
- (3) All Computer Hardware shall 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.

- (4) An adequate supply of blank CD's/DVD's, and paper and toner cartridges for the printer shall be provided by the Contractor, and shall be replenished by the Contractor as required by the Engineer.
- (5) 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.

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 Raul Canabal, Assistant Commissioner of Information Technology Services at 718-391-1668.

I. PUBLIC TELEPHONE (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

1. The Contractor shall provide a public telephone located on the site, where directed, for the duration of the Contract.

J. HEAD PROTECTION (HARD HATS)

1. The Contractor shall provide a minimum of 10 standard protective helmets for the exclusive use of Department of Design and Construction personnel and their visitors. Helmets shall be turned over to the Resident Engineer and kept in the office of the Resident Engineer.
2. Upon completion of the project, the helmets shall become the property of the Contractor.

K. RODENT AND INSECT CONTROL

1. **DESCRIPTION** - The General Contractor shall 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:
 - a. Wet areas within the project area, including all temporary structures.
 - b. All exterior and interior temporary toilet structures within the project area.
 - c. All Field Offices and shanties within the project area of all Contractors and the Department of Design and Construction (DDC).
 - d. 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.
 - e. Any other portion of the premises requiring such special attention.
2. **MATERIALS:** All materials shall be approved by the New York State Department of Environmental Conservation 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
3. **PERSONNEL:** All pest control personnel must be supervised by an exterminator licensed in categories 7A & 8.
4. **METHODS**

- a. Application and dosage of all materials shall be done in strict compliance with the manufacturer's recommendations.
- b. Under the Maintenance of Site item (section 1.42.L), any unsanitary conditions, such as uncollected garbage or debris, resulting from the General Contractor's activities which will provide food and shelter to the resident rodent population shall be corrected by the General Contractor immediately after notification of such condition by the Commissioner

5. RODENT CONTROL WORK

- a. 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 shall be used in areas within seventy-five (75) feet of all streambanks. Live traps must be used in these seventy-five (75) foot buffer zone areas and within wetland and woodland areas.
- b. 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 shall be placed during the period of construction and any consumed or decomposed bait shall be replenished as directed.
- c. At least one 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, shall be placed at locations that are inaccessible to pets, human beings, children and other non-target species, particularly wildlife (for example-birds) in the project area.
- d. The General Contractor shall be responsible for collecting and disposing of all trapped and poisoned rodents found in live traps and tamper proof bait stations. The General Contractor shall also be responsible for posting and maintaining signs announcing the baiting of each particular location.

The General Contractor, under his/her Maintenance of Site operations, shall be responsible for the immediate collection and disposal of any visible rodent remains found on streets or sidewalks within the project area.

- e. It is anticipated that public complaints will be addressed to the Commissioner. The General Contractor, where directed by the Commissioner, shall 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.
- f. Emergency service during the regular workday hours (Monday through Friday) shall be rendered within 24 hours, if requested by the Commissioner, at no additional cost to the City.

6. EDUCATION & TRAINING

- a. The General Contractor shall post notices on all Construction Bulletin Boards advising workers, employees, and residents to call the Engineer's Field Office to report any infestation or outbreak of rodents, rats, mice, water beetles, roaches and fleas within the project area. The General Contractor shall provide and distribute literature pertaining to 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.
- b. Prior to application of any chemicals, the General Contractor shall furnish to the Commissioner copies or sample labels for each pesticide, antidote information, and Material Data Safety Sheets (MSDS) for each chemical used.

7. RECORDS AND REPORTS

- a. The General Contractor shall keep a record of all rodent and waterbug infestation surveys conducted by him/her and make available, upon request, to the Commissioner. The findings of each survey shall include, but not be limited to, recommended Integrated Pest Management (IPM) techniques, like baiting, trapping, proofing, etc., proposed for rodent and waterbug pest control.
- b. The General Contractor shall maintain records of all locations baited along with the type and quantity of rodenticide and insecticide bait used.

L. SITE SECURITY/PERIMETER SIGNAGE

1. In order to properly convey notice to persons entering upon a City construction site, the Contractor shall furnish and install a sign at the entrance (gates) as follows:

NO TRESPASSING

AUTHORIZED PERSONNEL ONLY

2. If no construction fence exists at the site, this notice shall be conveyed by incorporating the above language into safety materials (barriers, tape, and signs).

M. MAINTENANCE OF SITE AND ADJOINING PROPERTY

1. Take over and maintain the site, after order to start work.
2. Until the work of the Contract is completed and accepted, the Contractor shall be responsible for the safety of the adjoining property, including sidewalks, paving, fences, sewers, water, gas, electric and other mains, pipes and conduits etc. The Contractor shall, at its own expense, except as otherwise specified, protect same and maintain them in least as good a condition as that in which the Contractor finds them.
3. All pavements, sidewalks, roads and approaches to fire hydrants shall be kept clear at all times, maintained and repaired to serviceable condition with materials to match existing.
4. Provide and keep in good repair all bridging and decking necessary to maintain vehicular and pedestrian traffic.
5. The Contractor shall also remove all snow and ice as it accumulates on the sidewalks within the Contract Limits Lines.

N. SAFETY PRECAUTIONS FOR CONTROL CIRCUITS

1. Control circuits, the failure of which will cause a hazard to life and property, shall comply with the New York City Dept. of Buildings, Bureau of Electrical Control requirements.

O. OBSTRUCTIONS IN DRAINAGE LINES

1. The Contractor shall 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 shall be kept clear of any and all debris. Any stoppage shall be repaired immediately at the expense of the Contractor for General Construction Work.

P. MAINTENANCE OF PROJECT SITE

1. Take over and maintain all project areas, after order to start work.
2. Until the work of the Contract is completed and accepted, the Contractor shall be responsible for the safety of all project areas, including water, gas, electric and other mains and pipes and conduits and shall 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.
3. All pavements, sidewalks, roads and approaches to fire hydrants shall be kept clear at all times, maintained, and if damaged, repaired to serviceable conditions with materials to match existing.
4. The Contractor shall keep the space for the Resident Engineer in a clean condition.

Q. PROJECT SIGN AND RENDERING
PART A – PROJECT SIGN

1. Responsibility: The Contractor shall produce and install one (1) project sign which shall be posted and maintained upon the site of the project at a point and in a position where directed by the Commissioner. The Contractor shall protect the sign from damage during the continuance of work under the Contract and shall do all patching of lettering, painting and bracing thereof necessary to maintain same in first class condition and in proper position. Prior to fabrication, contractor shall submit an 8-1/2" x 11" color match print proof from the sign manufacturer of completed sign for approval by the Commissioner.
2. Sign Quality: The Contractor shall provide all materials required for the production of the sign as specified herein. Workmanship shall be of the best quality, free from defects and shall be produced in a timely manner.
3. Schedule: Upon project mobilization, the Contractor shall commence production and installation of the sign.
4. Removal: At the completion of all work under the Contract, the Contractor shall remove and dispose of the project sign away from the site.
5. Sign construction:
 - a. Frame: The frame shall be from quality dressed 2"x2" pine, fire retardant, pressure treated lumber, that surrounds the inside back edge of the sign. The sign shall have one (1) intermediate vertical and two (2) diagonal supports, glued and screwed for rigidity. Frame shall be painted white with two (2) coats of exterior enamel paint, prior to mounting of sign panel.
 - b. Edging: U-shaped, 22 gauge aluminum edging, with a white enameled finish to match sign background, shall run around entire edging of sign panel and frame. Corners shall be mitered for a tight fit. Channel dimensions shall 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 shall be constructed in one (1) piece of 14 gauge (.0785") 6061-T6 aluminum. This panel shall be prefinished 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 1/2" below edge of panel and 8" on center. The U-shaped aluminum channel shall 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. All visual components of the sign are in an Adobe *.pdf file, which is provided by the

Commissioner's representative. The file is to be opened in Acrobat Professional or Acrobat Approval in order to be saved with project information. The Commissioner's representative shall insert the project name and names and titles of personnel (3 or more) and any other required information associated with the project. At no point in the update, saving or renaming of the file should it be locked by any user. The digital file shall be provided by DDC to the Contractor (on a CD or via E-mail) for printing.

- b. The DDC *.pdf file with names provided by the commissioner shall be reproduced at the Sign Panel size of 4' x 8' on 3M High Performance Vinyl or approved equal. The sign manufacturer is required to print from the Acrobat *.pdf provided, and must match the following colors specified by Pantone: 3025 C, 119 C, 131 C, 1805 C, 1817 C in their exact locations as indicated in the *.pdf file, and on the DDC website: www.nyc.gov/buildnyc.
- c. Color shall be created in a four-color process to reproduce Pantone Colors (per Pantone formula).
 1. Pantone color 3025 C (C-100, M-17, Y-0, K-51).
 2. Pantone color 119 C (C-0, M-12, Y-100, K-49).
 3. Pantone color 131 C (C-0, M-32, Y-100, K-23).
 4. Pantone color 1805 C (C-0, M-91, Y-100, K-23).
 5. Pantone color 1817 C (C-0, M-90, Y-100, K-66).

The typeface, Helvetica shall be used in all text-fields as is specified in the settings of the Acrobat *.pdf.

Note: 3M High Performance Vinyl or equivalent shall be guaranteed for nine (9) years. Guarantee must cover fading, peeling, chipping or cracking.

PART B – PROJECT RENDERING (REFER TO THE ADDENDUM TO THE GENERAL CONDITIONS FOR THE APPLICABILITY OF THIS ARTICLE)

1. Responsibility: In addition to the Project Sign, the Contractor shall furnish and install one (1) sign showing a rendering of the project. From an approved image file provided by the DDC, the Project Rendering is to be sized, printed, and mounted in an identical manner as described in Part A above for the Project Sign. Any area of the 4' X 8' panel area not filled by the rendering shall be printed in Pantone color 3025 (c-100, M-17, y-0, K-51). 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 shall 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 shall remove and dispose of the project rendering away from the site.

R. PLANT PEST CONTROL REQUIREMENTS and TREE PROTECTION REQUIREMENTS

1. Plant Pest Control Requirements: The Contractor for General Construction Work (the "Contractor") and its subcontractors, including the Certified Arborist described below, shall 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.

- a. All tree work performed within the quarantine areas must be performed by New York State Department of Agriculture and Markets (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 sub contractor performing tree work has entered into a compliance agreement with NYSDAM. The terms of said compliance agreement shall be strictly complied with. Any host material so removed shall be delivered to a facility approved by NYSDAM. For the purpose of this contract host material shall be ALL species of trees.
 - b. Any host material that is infested with the Asian Longhorned Beetle must be immediately reported to NYSDAM for inspection and subsequent removal by either State or City contracts, at no cost to the Contractor.
 - c. Prior to commencement of tree work, the Contractor shall submit to the Commissioner a copy of a valid Asian Longhorned Beetle compliance agreement entered into with NYSDAM and the Contractor or its sub contractor performing tree work. If any host material is transported from the quarantine area the Contractor shall 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.
 - d. Quarantine areas, for the purpose of this contract shall be defined as all five boroughs of the City of New York. In addition, prior to the start of any tree work, the Contractor shall contact the NYC Department of Parks & Recreation's 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.
2. **Tree Protection Requirements:** The Contractor shall retain a Certified Arborist, as defined by New York City Department of Parks and Recreation (NYCDPR) regulations, to provide the services described below.
 - a. **Surveys and Reports:** The Certified Arborist shall, 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 above; (3) evaluation of the general health and condition of any infected plant material.
 - b. **Frequency of Reports:** The Certified Arborist shall 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 24 months in duration, the Certified Arborist shall conduct a survey and prepare a report at the midpoint of construction. Copies of each plant material assessment report shall be submitted to the Resident Engineer within two (2) weeks of the survey.
 - c. **Proximity to Project Site:** Off-site trees, significant shrubs and/or planting masses shall be considered to be located in proximity to the project site under the circumstances described below.
 1. The tree trunk, significant shrub, or primary cluster of stems in a planting mass is within 50 (fifty) feet of the project's Contract Limit Lines (CLLs) or Property Lines (PLs).
 2. Any part of the tree or shrub stands within 50 (fifty) 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.

3. 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 50-foot inclusionary perimeter as outlined above.

- d. Tree Protection Plan: The Certified Arborist shall prepare, and the Contractor shall 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 NYCDPR jurisdiction as determined by the Department of Transportation, and (4) all trees that are located in proximity to the project site, as defined above. The Tree Protection Plan shall comply with the NYC 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 shall be submitted to the Resident Engineer prior to the commencement of construction. Implementation of the Tree Protection Plan for street trees and trees under NYCDPR jurisdiction shall 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 50 feet of the intersection of the project's site's property line with the street frontage property line.

3. No Separate Payment. No separate payment shall 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 shall be deemed included in the Contractor's bid for the Project.

THIS PAGE INTENTIONALLY LEFT BLANK

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

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

Contract for Furnishing all Labor and Material Necessary

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____



FMS ID: PV467BRAC-R



**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/buildnyc

Contract for Furnishing all Labor and Material Necessary and Required for:

CONTRACT NO. 1 GENERAL CONSTRUCTION WORK

Bronx River Art Center Renovation

LOCATION: 1087 East Tremont Avenue
BOROUGH: Bronx 10460
CITY OF NEW YORK

S&N Builders, Inc.

Contractor

Dated January 9, 2014, 20 14

Approved as to Form
Certified as to Legal Authority

[Signature]

Acting Corporation Counsel

Dated March 11, 20 13

Entered in the Comptroller's Office

First Assistant Bookkeeper

Dated _____, 20 _____

BK
3.11.13





PROJECT ID:

PV467BRAC-R

**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/buildnyc

LAW

VOLUME 3 OF 3

**ADDENDUM TO THE GENERAL
CONDITIONS**

SPECIFICATIONS

FOR FURNISHING ALL LABOR AND MATERIALS
NECESSARY AND REQUIRED FOR:

Bronx River Art Center Renovation

LOCATION:
BOROUGH:
CITY OF NEW YORK

1087 East Tremont Avenue
Bronx 10460

CONTRACT NO. 1

GENERAL CONSTRUCTION WORK

Department of Cultural Affairs

Sage and Coombe Architects



Date:

February 8, 2013

3-023



ADDENDA CONTROL SHEET

TITLE: Bronx River Art Center Renovation

**GENERAL
COUNSEL**

[illegible]

THE CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF STRUCTURES

June 10, 2013

ADDENDUM No. # 1

FOR FURNISHING ALL LABOR AND MATERIAL NECESSARY AND REQUIRED FOR:

PV467BRAC-R
Bronx River Art Center Renovation

This addendum is issued for the purpose of amending the requirements of the Bid and Contract Documents and is hereby made a part of said Bid and Contract Documents to the same extent as though it were originally included therein.

The bidder is advised that the items listed below apply to the project:

1. **The Bid Opening for the contract described below scheduled for June 5, 2013, at 2:00 pm is rescheduled to June 20, at 2:00 pm.**

Contract #1 – General Construction Work

2. **Questions from Bidders and Responses to Questions:**

See Attachment A.

3. **Revisions to Bid Booklet**

See Attachment B.

4. **Revisions to Specifications**

See Attachment C.

5. **Revisions to Drawings:**

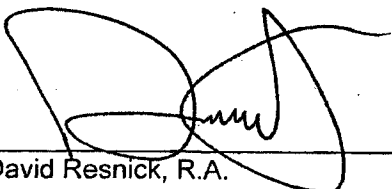
See Attachment D.

6. **Photographic Documentation:**

See Attachment E.

THIS ADDENDUM MUST BE SIGNED BY ALL BIDDERS AND ATTACHED TO THEIR BIDS.

If additional information is required, please contact the Department of Design and Construction, Contract Section at (718) 391-2200, (718) 391-1727, or by fax at (718) 391-2615.



David Resnick, R.A.
Deputy Commissioner

Name of Bidder

By: _____

DDC PROJECT #: PV467BRAC-R

PROJECT NAME: BRONX RIVER ART CENTER BUILDING RENOVATION

ATTACHMENT A - BIDDERS QUESTIONS AND DDC RESPONSES

No	Bidders Questions	DDC Responses
1	<p>a. General Demo Note #8 indicates that ongoing security is to be maintained. General Protection & Coordination Note #4 indicates the Contractor is to provide 24 hour guard service, if required. Are we to provide security 24/7? Is there a security service on site? What are their hours of operation and rate of pay?</p> <p>b. General Demo Note #8 and General Protection & Coordination Note #2 infer that the building is occupied and construction is to be done in phases. Please confirm that the building will be vacant during construction.</p> <p>c. Please confirm that if Alternate #3 is not accepted, the only construction scope is to remove and reinstall the existing windows and caulk the perimeter. No repairs to the existing windows, no re-glazing, etc.</p>	<p>a. Contractor is to provide security guards on the site, as per General Conditions article 1.26. There is no security service on site.</p> <p>b. Building will not be occupied during construction.</p> <p>c. Window #48 on the 4th floor east façade requires glazing repair. See Attachment D, Revisions to Drawings.</p>
2	<p>Please clarify Item #36 of Asbestos Abatement General Notes. We can only figure what has been defined in the Contract Documents. Asbestos-containing material is only determined by laboratory testing. We do not have that ability. Please clarify.</p>	<p>All known abatement work is identified in the contract and is the limit of contract work. All unforeseen field conditions will be subject to testing and removal if required. See section 028013, Allowance for Incidental Asbestos Abatement.</p>
3	<p>a. Reference is made to Contract Drawing A605, Elevation 10, which references Detail 7 on drawing A614 for Pantry Elevation. Please be advised there is no Contract drawing A614 listed on the Drawing List, nor is it in the set of plans. Please advise.</p> <p>b. A number of drawings and/or elevations show manual roll down shades, but there is no specification section for this item. Is this an owner-furnished and installed item? Please advise.</p>	<p>a. Dwg A614 is no longer part of the set. All references to A614 are deleted. Added reclaimed sink note to A605 to match fourth floor plan A104. See Attachment D, Revisions to Drawings.</p> <p>b. There are no window shades in the scope. Window shades shown on drawing A400 have been deleted. See Attachment D, Revisions to Drawings.</p>
4	<p>Will scaffolding of the exterior of the building be permitted?</p>	<p>Contractor is allowed to install scaffolding on the exterior of the building but should get all required permits and engineering approvals from DOB, DOT and DPR.</p>
5	<p>a. Please provide specification for folding door, section 083510.</p> <p>b. Does detail 4/A531 apply to all windows on all elevations?</p> <p>c. Does the note "existing windows to be reinstalled" apply to all the windows on the North Elevation as shown on drawing A/303?</p>	<p>a. See Attachment C for Specification Section 083510 Folding Doors.</p> <p>b. See A530 window schedule for head, jam and sill details.</p> <p>c. No. The note "existing windows to be reinstalled" does not apply to north elevation. All window openings and windows on North Elevation are</p>

	<p>d. There are 3 reconfigured window openings shown on drawing A303. Are the windows for these openings to be new?</p> <p>e. The existing window caulking is to be removed as shown on drawings H-005-008. If Alternate #3 is not done, will all existing windows be recaulked?</p>	<p>new and in the base bid. See Attachment D, Revisions to Drawings.</p> <p>d. See 'c' above.</p> <p>e. All caulk as shown in H drawings is to be abated and replaced for new in reinstalled or existing windows.</p>
6	<p>There presently is a fence gate across the de-mapped street. Can the de-mapped street be used as a staging area during construction, and can an office trailer be located in the same area? If not, please designate where the construction trailer and staging area can be located.</p>	<p>No, the de-mapped street cannot be used as a staging area. Use Tremont Avenue and sidewalk as staging area.</p>
7	<p>a. Article 1.34 Temporary Services, which the Supplemental General Conditions indicates applies to this contract, Part B states that the electricity "for temporary light and the operation of small tools is available in the area of this project and will be furnished to the Contractor for General Construction Work by the Contractor for Electrical Work without cost." Since this is not a WICKS law project, please clarify.</p> <p>b. The finish schedule indicates floors in toilet rooms 208, 209 & 409 to be Paint #3. Is this correct?</p>	<p>a. General Contractor is responsible for all required temporary services related to electricity as per contract requirements. See Section III in the Addendum to the General Conditions.</p> <p>b. No, tile is correct. A700 Finish Schedule has been amended. See Attachment D, Revisions to Drawings.</p>
8	<p>a. Will stair B first floor through second floor landing be a concrete floor and treads finish? Meaning the terrazzo work begins at the second floor treads and goes up from that point.</p> <p>b. Stairs A and B are to be figured as a terrazzo repair/refinish job with a 25% replacement of both platforms/landings/treads respectfully, correct?</p> <p>c. Is there any vertical terrazzo repair/refinish work in stairs A and B? Meaning terrazzo stringers and or base?</p> <p>d. When will this project work start?</p> <p>e. Is there a photograph of the terrazzo tread platform and landing that can be viewed?</p>	<p>a. See drawings A510 & A512. New sections to be steel pan stairs with concrete treads and landings.</p> <p>b. See drawing A401.</p> <p>c. There is no vertical terrazzo repair/refinish in stairs A or B.</p> <p>d. Project is to commence in fall 2013.</p> <p>e. See Attachment E for photographs.</p>
9	<p>a. Lutron is responsible only for: "Gallery C" as shown on E206.00. Please confirm.</p> <p>b. Symbol "boxed" KP on E201.00 is assumed to be SG keypads on E206.00. (4) such keypads are shown on E206.00. (3) such symbols are on E201.00. Please confirm quantity.</p> <p>c. E206.00 keypads shown (4) two-gang applications. The first gang is SG-4sn-WH-EGN. The second is in question. Please confirm intent and/or part #.</p> <p>d. From fixture schedule (E206.00), zone information (E206.00), and zone to fixture info from E201.00 there are discrepancies. Examples: a) Fixture C6 on zone G25 is a CFL down light and is listed as 36w of ELV on the one-line b) Fixture M1 on zone 14 is matched with a FDBI fluorescent interface and listed as ELV while M1 is also on zone 15 matched with an</p>	<p>a. Correct. Lutron Grafik Eye equipment is specified for Gallery C only, however, it is responsibility of electrical contractor to provide, install and program this equipment.</p> <p>b. Provide 4 Key Pads, as Per Revised Plan. See Attachment D, Revisions to Drawings.</p> <p>c. Control diagram on drawing E-206 indicates all Key Pads to be of the same model/type.</p> <p>d. Luminaire schedule shall be referenced in case of fixture type discrepancies. See Attachment C, Revisions to Specifications. a) ELV is not required. Refer to revised diagram. b) ELV is not required in zone 14. Refer to revised diagram. NGRX was provided due to load size, but not control type.</p> <p>e. Can be provided instead of FDBI or NGRX.</p> <p>f. See Attachment C, Revisions to Specifications.</p>

	<p>NGRX interface.</p> <p>e. FDBI and NGRX interfaces have been replaced with PHPM-3F-DV-WH and PHPM-PA-DV-WH respectively. Please confirm.</p> <p>f. In spec sheets <u>SECTION 260923 LIGHTING CONTROL DEVICES</u>, 3.6 DEMONSTRATION, A says to refer to General Conditions for minimum Demonstration and Training requirements. Can this be supplied? We need to ensure that if non-standard services are required they are built into the BOM.</p>	
10	<p>a. AHU-SR includes a steam canister. There are five humidistats located on the drawings. Please advise how those five humidistats are controlled.</p> <p>b. Dwg. M105.00 calls for kiln vents, and asks for coordination with the manufacturer. Who is the manufacturer? What material is required for exhaust?</p> <p>c. Dwg. M106.00 shows the elevator door opening on the roof. Can we use that elevator to bring equipment onto the roof?</p>	<p>a. For dehumidification control, refer to mechanical specification, 230993 Sequences of Operation.</p> <p>b. SKUTT and AMACO are manufacturers for the existing kilns. Provide venting kits as per manufacturer.</p> <p>c. No. Elevator is not to be used during construction or for construction purposes.</p>
11	<p>a. What type of material is used in Base #3?</p> <p>b. Section 093100 paragraph 1.2 states porcelain floor tile in pantry and bathrooms. Finish schedule indicates the finish on these floors is concrete. Which is correct?</p>	<p>a. Rubber base. See Specification 096519 Resilient Tile Flooring.</p> <p>b. Bathrooms have tile flooring. For pantry see 5/A711.</p>
12	<p>a. The H drawings show the risers for the HWS/R, they do not however show a size for the risers on Drawings MH-103 & 104. Please advise.</p> <p>b. Drawing M106 shows the layout of the boiler room, but does not show any piping, piping layout or pipe sizes (with the exception of the risers going down). Please advise.</p> <p>c. Drawing M105 states ductwork and rain hoods must be provided for three existing kilns. Also duct and rainhoods should be as per kiln manufacturers. During our walk through there were no kilns in the building. Please advise.</p>	<p>a. All risers are 3" diameter, except for 4" express risers.</p> <p>b. Refer to drawing M107 for boiler room piping diagram.</p> <p>c. Kilns are currently in storage and will be supplied for installation by contractor as per Drawing A104.</p>
13	<p>Please provide information on the underground storage tank that needs to be removed at the Cellar. Is the tank sitting on the cellar floor slab? What is the capacity of the tank?</p>	<p>See Appendix Documents. Phase I Environmental Site Assessment notes concrete-encased fuel oil storage tank is approximately 1,500 gallons in size. See Attachment E for photographs of the tank.</p>
14	<p>a. Note 8.1 in Drawing S102 refers to full bearing of existing joists. How many joists are affected? Note 9 in Drawing S102 refers to the replacement of sagged joists. How many joists are affected?</p> <p>b. As far as we can see, fireproofing is only required at the existing window lintels. Is that correct?</p> <p>c. Detail 1/A542 – What is the note "closed cell spray insulation" pointing to?</p> <p>d. Dwg. A531 – Please clarify what lintel work will be required if alternate #3 is not taken.</p>	<p>a. Note 8.1 and 9 on sheets S102 through S104 (ensuring full bearing of existing joists at exterior wall and interior steel): the quantity is approximately 5% of the joists. See Attachment D, Revisions to Drawings and Attachment B, Revisions to Bid Booklet for Unit Price Schedule.</p> <p>b. Fireproofing is required at the underside of the window lintel.</p> <p>c. It is pointing at the symbol for spray-on insulation</p> <p>d. If Alternate 3 is not taken, existing window is to</p>

	<p>e. Is all the closed cell insulation referenced on the drawings sprayed insulation?</p> <p>f. At the walk-through the cellar and rear area of the 1st floor were not available for viewing. Will there be another walk-through so these areas can be observed?</p> <p>g. Is there any concern for lead paint on the premises?</p>	<p>be removed, all noted lintel work on drawings A531 and A532 to be done, and window to be reinstalled. For lintels to be replaced see S201.00.</p> <p>e. Spray insulation as per specification 072150 is used only on the exterior wall.</p> <p>f. No, there will not be another walk-through. See drawing A050 for current cellar conditions and Attachment E for photos.</p> <p>g. Contractor should apply standard practice on all paint removal. All work that disturbs painted surfaces containing lead shall be performed in accordance with the Occupational Safety and Health Administration (OSHA), 29 CFR 1926.62 (Lead in Construction Standard). The Contractor shall be familiar with the OSHA regulations and its requirements.</p>
15	On drawing M100 Key note #4 indicates to provide drain pan for ceiling hung units per drawing M107. Please note M107 does not show a drain pan and Key Note #4 is not tagged at any of the units throughout the building. Please clarify.	Drip pan detail was deleted from drawing M107 since the ceiling hung units were eliminated from the scope of work. See Attachment D, Revisions to Drawings for revised drawing M100.
16	<p>a. Refer to drawing A020 and C100. It seems that the existing condition does not match drawing C100 (remove full-depth asphalt from northern concrete paving) since the existing is gravel road base without any asphalt. Also dwg A020 states that Asphalt Blocks are NIC. Please clarify the scope of the exterior work that should be included in this contract.</p> <p>b. Refer to drawing A531 and A532, it is our interpretation that only underside of the exposed lintels need spray intumescent fireproofing. Please clarify.</p>	<p>a. Current existing condition is gravel. Restore surface as is at time of start of construction.</p> <p>b. Correct.</p>
17	<p>a. Detail 17/A600 refers to section 6/A723. There is no A723. Please locate the detail.</p> <p>b. Detail 6/A600 refers to section 8/A722. This does not appear to be correct. Please advise.</p> <p>c. Please advise where the manufactured casework per specification section 123200 is located.</p> <p>d. Dwg. P104. What does the note "add/alternate 3rd floor fit-out for building safety" mean?</p> <p>e. The Fire Protection drawings indicate GWB ceilings, ACT ceiling heights, Bottom of Beam heights and Top of Sprinkler Pipe elevations. In areas with GWB ceiling the heights and elevations given would indicate that the new sprinkler pipe is being installed exposed below the new GWB ceiling. The fire protection plans call for the sprinkler heads to be the Concealed type in areas with GWB ceilings. Since the new sprinkler piping is installed below the GWB ceiling should the sprinkler head type be changed to an Upright sprinkler? Or is it the design intent that the horizontal pipe be exposed and at each Concealed head the piping rise up into the floor joist space with a return bend to install the concealed</p>	<p>a. Dwg. A723 is no longer part of the set. All references to A723 are deleted. See Attachment D, Revisions to Drawings.</p> <p>b. Detail 6/A600 has been amended. See Attachment D, Revisions to Drawings.</p> <p>c. Specification section 123200 Manufactured Wood Casework is no longer part of this contract. Any references to this section are deleted. See Attachment C, Revision to Specifications.</p> <p>d. This note is deleted. See Attachment D, Revisions to Drawings.</p> <p>e. The sprinklers will be upright type. Pipe exposed, installed below ceiling.</p> <p>f. In areas with dropped ceiling the sprinkler heads will be concealed type. Dwg. SP-001.00 shows two details: for upright and for concealed installation.</p> <p>g. Areas with dropped ceiling will have concealed sprinklers, the areas without dropped ceiling install upright sprinklers.</p> <p>h. The insulation is required. Heat tracing is not required.</p>

	<p>head in the GWB ceiling?</p> <p>f. The sprinkler plans as designed and detailed with ceiling heights, bottom of beam elevations and top of sprinkler pipe elevations do not match your detail for "Sprinkler Head Connection for Suspended Ceiling" on drawing SP-001.00.</p> <p>g. Please advise as to the design intent and type of sprinkler head to be used in the aforementioned areas.</p> <p>h. Drawing SP-104 shows a 1" pipe rising up next to the elevator. As it rises up to the top of the elevator hoist way the piping will be installed on an exterior wall. Will Heat Tracing and Insulation be required for the scope of the work? Please advise.</p> <p>i. Drawing SP-105 indicates that there is a Sprinkler control valve assembly in stair A at the Roof Level. The riser diagram shown on SP-001 does not show this assembly. Which is correct? Please advise.</p> <p>j. Stair B starts on the 1st floor from an exterior entrance and then continues up the building. Code requires that the heat be maintained at 40 degrees to avoid freeze ups. Will adequate heat be provided or will this installation require the new piping in Stair B be Heat Trace and Insulated? Please advise.</p> <p>k. Code requires that a control valve with tamper and flow switches be installed on the sprinkler heads that are installed at the bottom and top of the elevator. None are shown, should the assemblies be included in the scope of work? Please advise.</p> <p>l. The contract drawings do not indicate that the Sprinkler Riser is a Combination Riser to include 2 1/2" Fire Hose Valves at each floor. In addition, there is no mention of a Temporary Standpipe and Temporary Fire Department Connection for use during construction. Should the Sprinkler Riser Designation be revised to a Combination Standpipe Riser to include the Fire Hose Valves? Is the temporary Riser and Fire Department Connection required for this project? Please advise.</p>	<p>i. SP-105.00 is correct. See Drawing SP-001.00 for revised sprinkler riser diagram.</p> <p>j. The Stair B is heated by radiator. See mechanical drawing MH-102.00</p> <p>k. Yes, include valve with tamper and flow switch in scope of work. See Attachment D, Revisions to Drawings.</p> <p>l. Temporary Rise and Fire Department Connection is not required. The standpipe system is not required for this building as per NYC Building Code Section 905. Therefore there are no fire hose valves and combination risers.</p>
18	<p>a. Please provide piping layout for the boiler room with pipe sizes and all specialties. Also, please provide riser diagram.</p> <p>b. Bid Alternate #2 lists dwgs. SP001, SP102 & SP104 as being affected. We see no markings showing Alt #2 work.</p> <p>c. Bid Alternate #2 – Dwgs. P001, P101, P102, P103, P104, P105, P106, P107 & P500 are listed in the description, and work is shown on the drawings, however plumbing work is not listed in the breakdown. Please clarify.</p> <p>d. Bid Alternate #2 – Please advise if the following work is part of the base bid or Alt #2: Demolition of, and reconstruction of the roof area from the south parapet to the Boiler Room wall, as shown on dwgs. A055, A105, S105, and construction of the concrete pads for the new equipment.</p>	<p>a. For riser diagram refer to dwg.M107.00. Exact boiler piping layout shall be prepared by the contractor as part of shop drawing submissions.</p> <p>b. Those drawings were not affected by Alt#2. See Revised Bid Booklet page 13-R, included with this Addendum.</p> <p>c. Listed drawings reflect Alt #2 work. Occurrences are noted in drawings and associated plumbing costs are included with the work of Alt #2 work.</p> <p>d. This work is part of the Base Bid as indicated on the drawings.</p> <p>e. Water evacuation needs to be handled in a manner consistent with governing agency and regulatory requirements.</p> <p>f. Yes, brick at the new openings should be toothed.</p>

	<ul style="list-style-type: none"> e. Can water which may be in the building be pumped back into the river? f. At the north and west elevations, where new doors and storefronts are to be installed, the jambs of the new opening do not show the brick work requiring toothing of the existing brick. Should not the jambs of the new opening be toothed similar to the existing openings that are being filled in? 	
19	<ul style="list-style-type: none"> a. We request that Sherwin-Williams' Firetex FX 5120 be considered an optional product for the intumescent paint. b. As per base bid, existing windows are to be removed and reinstalled. What type of anchor was used to secure the window? If it was a built-in anchor, the masonry adjacent to the anchor must be removed not to damage the window and rebuild the window anchor into the wall when reinstalling the window. If the alternate is accepted, how is the new window secured to the existing masonry? c. As this contract is subject to the Project Labor Agreement (PLA), are Payroll Reports Required? <ul style="list-style-type: none"> 1. Is the site certified as environmentally clean? 2. If not who would be responsible for obtaining that certification? d. There is a percentage of subfloor that is asked to be replaced. <ul style="list-style-type: none"> 1. What % needs replacement? e. Work regarding windows <ul style="list-style-type: none"> 1. Who determines which windows can't be repaired and require replacement? f. Elevator: Doing the work necessary to put in a new elevator would require removal and replacing of joists. Would that count in the original determination of the % of joists? 	<ul style="list-style-type: none"> a. The product will be reviewed once a formal submittal has been proposed. b. This is Means and Methods of construction. c. Yes, Payroll Reports are required. <ul style="list-style-type: none"> 1. There is no site work. Question not applicable. 2. The only related environmental work is the tank removal. See drawing A050 for location and specification section 020700 Removal of Underground Storage Tanks for requirements of removal contract. d. 1. The subfloor will be replaced in its entirety on floors 2, 3, 4 and roof. e. 1. All windows to be reinstalled except for new windows. Window with damaged glazing will have glazing replaced as determined by DDC. f. No.
20	The fine print in Specification 265113, Appendix A, pg 1-6 is illegible. Could you please provide revised copies?	See Attachment C, Revisions to Specifications for Appendix A, Luminaire Schedule.
21	Specifications 220700 – 3.14 F Piping Concealed Painted Aluminum: Please clarify if concealed piping needs aluminum jacket?	Aluminum jackets are not required on concealed piping. See Attachment C for revised Specification Section 220700 Piping Concealed Painted Aluminum.
22	<ul style="list-style-type: none"> a. Detail 2/S401 as shown on dwg. S100 – Cellar Plan – appears to be meant for the 1st floor as shown on S100. Is this correct? b. Detail 11/S402 is showing a new W10 beam that does not show on the floor plan S102. Please clarify. c. General note #6 on dwgs. A101, A102, A103 & A104 calls for 25% repainting of the interior face of the exterior walls. Since the exterior of the building is repainted 100% and the interior is covered by drywall, is this work necessary? d. Drawing. S201 Note #2 – Provide the quantity of areas involved. We have no way of knowing existing lintel sizes. 	<ul style="list-style-type: none"> a. No. This detail is called out correctly. The basement is a partial basement and is being filled in. b. The beam for this location has been removed. The callouts for detail 11 on S402 adjacent to stair A are deleted. See Attachment D, Revisions to Drawings. c. Note #6 calls for "interior face of exterior wall to be repointed after removal of plaster" d. Assume all lintel replacement to be 2-C8x11.5. Remaining part of note is deleted. See Attachment D, Revisions to Drawings. e. All infills to be CMU and brick per architects

	<p>e. The architectural drawings are showing the infills to be CMU plus brick. The structural drawing S201 is stating brick. Which is correct?</p> <p>f. Ceilings in rooms 201, 204, 205, 206, 207 & 301 are shown as existing on the finish schedule, and new on the reflected ceiling dwgs. Which is correct?</p> <p>g. Notes on A203 referring to a patched ceiling are confusing. There is no existing ceiling in those areas.</p> <p>h. We do not see any frames or grates for the trench drain, sump pit or house pit. Are they required?</p> <p>i. Please provide a section through the concrete pavers and curb shown on A615.</p>	<p>drawing. CMU should be grouted solid, anchorage will be reviewed during shop drawing review period. See Schedule D, Revisions to Drawings for revised drawings S201.</p> <p>f. All ceilings are to be removed. Finish Schedule A700 has been amended. See Attachment D, Revisions to Drawings.</p> <p>g. Ceiling work in that area is removed. Notes have been removed from A203. See Attachment D, Revisions to Drawings.</p> <p>h. For house trap see A100 and A101, as well as P101 and S101. P101 shows sump pit at elevator. Drawing A101 shows access door to house trap. There is no trench drain.</p> <p>i. See details 3 and 6 on A541.</p>
23	<p>a. Drawing S101 indicates lateral shoring required on First Floor elevation. Please provide detail (or to what extent) of this lateral shoring.</p> <p>b. In the Bid Form, pg 21-38, Protect Ex. Retaining Wall, please clarify which retaining wall is being referred to.</p>	<p>a. All walls supporting the wet weight of concrete during the filling of the basement should be reviewed for shoring. For bidding purposes, the approximate length (extent) of this wall is 175ft.</p> <p>b. See drawing A101. Note refers to garden retaining wall curb N.I.C.</p>
24	<p>a. Where is the resinous floor coating applied to?</p>	<p>a. Resinous floor coating is in 501 boiler room, on the roof. See drawing A502 and Finish Schedule.</p>
25	<p>Asbestos Abatement drawing H-002.00 1st Floor Plan indicates removal of asbestos-containing wall plaster (white and brown coats). Do the same exterior wall finishes at the 2nd, 3rd and 4th floors contain asbestos? It is the same finish as the 1st floor.</p>	<p>Plasters on 2nd, 3rd and 4th floor were sampled and tested negative, only 1st floor was found ACM.</p>

Attachment B
Addendum #1
June 10, 2013

DDC PROJECT #: PV467BRAC-R

PROJECT NAME: BRONX RIVER ART CENTER BUILDING RENOVATION

ATTACHMENT B – REVISIONS TO THE BID BOOKLET

This attachment contains the following revised Bid Booklet items:

Delete page 13 of the Bid Booklet and replace with attached revised page 13-R.

Include attached page 13-0, Unit Price Schedule as part of the Bid Booklet.

Delete pages 13-1, 13-2, 13-3 of the Bid Booklet and replace with attached revised pages 13-1-R, 13-2-R, 13-3-R.

Delete pages 16, 17 of the Bid Booklet and replace with attached revised pages 16-1, 17-1, 16-2, 17-2, 16-3, 17-3.

Alternate Bids

Bidder is advised that the City is requesting the submission of three (3) alternate bids for **Contract #1 – General Construction Work** (Bid Alternate #1, Bid Alternate #2, and Bid Alternate #3). Each of these Bid Alternates addresses a different specific Scope of Work, as described below. Bid prices for these three (3) different Scopes of Work for General Construction Work shall be submitted on BID FORM - Bid Alternate 1, BID FORM - Bid Alternate 2, and BID FORM - Bid Alternate 3, in this Bid Booklet.

BID ALTERNATE #1: Requires a Total Lump Sum Price for all labor and material necessary to perform all required work described in the Contract Documents, **excluding** the scope of work for Bid Alternate #2 and Bid Alternate #3, as described below. Bid Alternate #1 is the Project Base Bid.

BID ALTERNATE #2: Requires a Total Lump Sum Price for the following: (1) all required work for Bid Alternate #1 (Project Base Bid), **plus** (2) all required work for the scope of Alternate #2 work. The scope of work for Alternate #2 is to provide an air conditioning system for Floors 1, 2 and 4 as described in the following Contract Documents:

Drawings: A201, A202, A204, P001, P101, P102, P103, P104, P105, P106, P107, P500, M100, M102, M103, M104, M105, M106, E102, E103, E105, E106.

Specifications: 238126, 238219 and specifications for associated work as described in Bid Booklet pages 21-40 through 21-44.

BID ALTERNATE #3: Requires a Total Lump Sum Price for the following: (1) all required work for Bid Alternate Bid #1 (Project Base Bid), **plus** (2) all required work for the scope of Alternate #2 work, **plus** (3) all required work for the scope of Alternate #3 work. The scope of work for Alternate #3 is to replace the windows as described in the following Contract Documents:

Drawings: A102, A103, A104, A105, A300, A301, A302, A303, A500, A501, A510, A530, A531, A532, A533.

Specifications: 085113 and specifications for associated work as described in Bid Booklet pages 21-45 through 21-46.

Bidders are requested to submit prices on the Bid Forms for alternate Bids described above. Following the receipt of Bids, the Department of Design and Construction will determine, in the best interest of the City, whether to award a contract based upon the Total Bid Price for Bid Alternate #1, Bid Alternate #2, or Bid Alternate #3.

Unit Price Schedule

Unit Price items: The items of work set forth in the Schedule below shall be performed by the contractor on a unit price basis for additional work. Such items of work shall be performed by the contractor only as directed in writing by the Commissioner.

The unit price for the items of work in the Schedule below are for EXTRA WORK ONLY i.e., work which is above and beyond that described in the Drawings and Specifications.

The bidder shall submit prices for all the items of work in the Schedule below. The bidder shall insert the total sum for all unit price items on the Bid Form, Item C - Allowance for Unit Prices. The unit price bid for each item shall include all costs and expense for the item, i.e., labor, material, overhead and profit. Quantities shown are approximate and for bid comparison purposes only. Actual amounts to be determined when the work is performed.

CSI #	Item #	Item Description	Quant.	Units	Unit Price	Total
061000	1	Replace Damaged Floor Joist	100	LF		
061000	2	Add Floor Joists for Floor Levelling	500	LF		
061600	3	Remove & Patch Damaged Roof Decking	100	SF		

Total Amount of Unit Price Work

* Insert Total amount of Unit Price Work on line C of Bid Form

(Bid Form - Bid Alternate 1, Bid Form - Bid Alternate 2, Bid Form - Bid Alternate 3)

*

Note: All quantities are approximate

BID FORM - BID ALTERNATE 1

PROJECT ID: PV467BRAC-R

TOTAL BID PRICE: In the space provided below, the Bidder shall indicate the total bid price in figures.

- A. **LUMP SUM PRICE** - Total price for all labor and material for all required work, excluding items (B) and (C) set forth below. Total Price shall include all costs and expenses, i.e. labor, material overhead and profit for all the Work, described and shown in the drawings and specifications.

Total Price For
Labor

Total Price for Material
Sold and Delivered

\$ _____ + \$ _____ Total Price for Item A \$ _____

- B. **ALLOWANCE** for Incidental Asbestos Abatement
(Section 028013 of the Specifications) \$15,000.00

- C. **ALLOWANCE** for Unit Prices - page 13-0 _____

TOTAL BID PRICE (Add A + B + C)
(a/k/a BID PROPOSAL) \$ _____

BIDDER'S SIGNATURE AND AFFIDAVIT

WARNING!! Failure to comply with items below will result in the rejection of your bid.

- * **SUBCONTRACTORS:** You **MUST** complete and submit the form entitled "Bidder's Identification of Subcontractors" (See Page 17) at the time you submit your bid. You must submit this form in a separate, sealed envelope (**BID ENVELOPE #2**). In the event an award of contract is not made to the Bidder, the Bidder hereby authorizes the Agency to shred the form entitled "Bidder's Identification of Subcontractors". _____ Yes
_____ No

- * **MWBE GOALS:** You **MUST** complete and submit the Affirmations contained in the Subcontractor Utilization Plan (See Page 7), or a pre-approved waiver (See Page 9), at the time you submit your bid. You must submit the Affirmations (or a pre-approved waiver) in **BID ENVELOPE #1**.

Bidder: _____

By: _____
(Signature of Partner or corporate officer)

Attest: _____
(Corporate Seal) Secretary of Corporate Bidder

Affidavit on the following page should be subscribed
and sworn to before a Notary Public

BID FORM - BID ALTERNATE 2

PROJECT ID: PV467BRAC-R

TOTAL BID PRICE: In the space provided below, the Bidder shall indicate the total bid price in figures.

- A. **LUMP SUM PRICE** - Total price for all labor and material for all required work, excluding items (B) and (C) set forth below. Total Price shall include all costs and expenses, i.e. labor, material overhead and profit for all the Work, described and shown in the drawings and specifications.

Total Price For
Labor

Total Price for Material
Sold and Delivered

\$ _____ + \$ _____ Total Price for Item A \$ _____

- B. **ALLOWANCE** for Incidental Asbestos Abatement
(Section 028013 of the Specifications) \$15,000.00

- C. **ALLOWANCE** for Unit Prices - page 13-0 _____

TOTAL BID PRICE (Add A + B + C)
(a/k/a BID PROPOSAL) \$ _____

BIDDER'S SIGNATURE AND AFFIDAVIT

WARNING!! Failure to comply with items below will result in the rejection of your bid.

- * **SUBCONTRACTORS:** You **MUST** complete and submit the form entitled "Bidder's Identification of Subcontractors" (See Page 17) at the time you submit your bid. You must submit this form in a separate, sealed envelope (BID ENVELOPE #2). In the event an award of contract is not made to the Bidder, the Bidder hereby authorizes the Agency to shred the form entitled "Bidder's Identification of Subcontractors". _____ Yes
_____ No
- * **MWBE GOALS:** You **MUST** complete and submit the Affirmations contained in the Subcontractor Utilization Plan (See Page 7), or a pre-approved waiver (See Page 9), at the time you submit your bid. You must submit the Affirmations (or a pre-approved waiver) in BID ENVELOPE #1.

Bidder: _____

By: _____
(Signature of Partner or corporate officer)

Attest: _____ Secretary of Corporate Bidder
(Corporate Seal)

Affidavit on the following page should be subscribed
and sworn to before a Notary Public

BID FORM - BID ALTERNATE 3

PROJECT ID: PV467BRAC-R

TOTAL BID PRICE: In the space provided below, the Bidder shall indicate the total bid price in figures.

- A. **LUMP SUM PRICE** - Total price for all labor and material for all required work, excluding items (B) and (C) set forth below. Total Price shall include all costs and expenses, i.e. labor, material overhead and profit for all the Work, described and shown in the drawings and specifications.

Total Price For
Labor

Total Price for Material
Sold and Delivered

\$ _____ + \$ _____ Total Price for Item A \$ _____

- B. **ALLOWANCE for Incidental Asbestos Abatement** \$15,000.00
(Section 028013 of the Specifications)

- C. **ALLOWANCE for Unit Prices - page 13-0** _____

TOTAL BID PRICE (Add A + B + C)
(a/k/a BID PROPOSAL) \$ _____

BIDDER'S SIGNATURE AND AFFIDAVIT

WARNING!! Failure to comply with items below will result in the rejection of your bid.

- * **SUBCONTRACTORS:** You **MUST** complete and submit the form entitled "Bidder's Identification of Subcontractors" (See Page 17) at the time you submit your bid. You must submit this form in a separate, sealed envelope (BID ENVELOPE #2). In the event an award of contract is not made to the Bidder, the Bidder hereby authorizes the Agency to shred the form entitled "Bidder's Identification of Subcontractors". _____ Yes
_____ No

- * **MWBE GOALS:** You **MUST** complete and submit the Affirmations contained in the Subcontractor Utilization Plan (See Page 7), or a pre-approved waiver (See Page 9), at the time you submit your bid. You must submit the Affirmations (or a pre-approved waiver) in BID ENVELOPE #1.

Bidder: _____

By: _____
(Signature of Partner or corporate officer)

Attest:
(Corporate Seal)

Secretary of Corporate Bidder

Affidavit on the following page should be subscribed
and sworn to before a Notary Public

BIDDER'S IDENTIFICATION OF SUBCONTRACTORS

BID ALTERNATE 1

NOTICE TO BIDDERS

SUBMISSION: The Bidder must, at the time of the bid, submit the form on the next page ("BIDDER'S IDENTIFICATION OF SUBCONTRACTORS"). This form must be submitted in a separate, sealed envelope (BID ENVELOPE #2). Failure to do so will result in the disqualification of the bid as non-responsive.

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

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

NOTE: This project may not involve all of the above listed subcontractors. Please see the form on the next page which indicates the subcontractors required for this Project.

The list of subcontractors is to be submitted in a separate sealed envelope by completing the form on the next page entitled "Bidder's Identification of Subcontractors". This form provides for the identification of any subcontractors intended to be used in any of the three trades listed above. If bidder intends to use its own forces for any of the above listed work, bidder should so indicate on the form.

Failure to submit the completed form on the next page ("Bidder's Identification of Subcontractors") that includes the names of subcontractors and the agreed upon amounts to be paid to such subcontractors will render the bid non-responsive.

PLEASE NOTE: for any contract that is subject to M/WBE participation goals under Local Law 129, if the bidder's intention to use its own forces to do any of the above-referenced work would result in Bidder's failure to attain the Target Subcontracting Percentage identified in the Subcontractor Utilization Plan, the bid will be non-responsive unless the bidder requests and obtains a Waiver of Target Subcontracting Percentage (Subcontractor Utilization Plan, Part III) in advance of bid submission.

After the low bid is announced, the sealed list submitted by the low bidder will be opened and the names of the subcontractors will be announced. The sealed lists of subcontractors submitted by all other bidders shall be maintained by the Agency unopened unless such bidder shall become the low bidder (e.g., the initial low bidder is found non-responsive). All unopened lists of subcontractors shall be returned to the bidders unopened after contract award, unless the bidder has given the agency permission to shred the form.

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

BIDDER'S IDENTIFICATION OF SUBCONTRACTORS

BID ALTERNATE 1

Project ID: PV467BRAC-R

SUBMISSION: In addition to its Bid (Bid Envelope # 1), the Bidder must, at the time of the bid, complete and submit this form in a separate, sealed envelope (Bid Envelope # 2). To complete this form, the Bidder must identify the subcontractors it intends to use for the work listed below, as well as the dollar amount to be paid to each subcontractor. Failure to complete this form and submit it in a separate, sealed envelope will result in the disqualification of the bid as non-responsive.

The Bidder intends to use the following subcontractors. If the Bidder intends to do any of the work referenced below with its own forces, the Bidder should complete this form using its own name. If multiple subcontractors for any trade are proposed, Bidder may submit multiple copies of this form.

1. PLUMBING CONTRACTOR:

(Print Name)

Agreed Amount To Be Paid To Subcontractor: \$ _____

2. HVAC CONTRACTOR:

(Print Name)

Agreed Amount To Be Paid To Subcontractor: \$ _____

3. ELECTRICAL CONTRACTOR:

(Print Name)

Agreed Amount To Be Paid To Subcontractor: \$ _____

BIDDER'S SIGNATURE: The Bidder must sign this form in the space provided below:

Name of Bidder: _____

By: _____

Signature of Partner or Corporate Officer

Print Name: _____

Title: _____

BIDDER'S IDENTIFICATION OF SUBCONTRACTORS

BID ALTERNATE 2

NOTICE TO BIDDERS

SUBMISSION: The Bidder must, at the time of the bid, submit the form on the next page ("BIDDER'S IDENTIFICATION OF SUBCONTRACTORS"). This form must be submitted in a separate, sealed envelope (BID ENVELOPE #2). Failure to do so will result in the disqualification of the bid as non-responsive.

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

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

NOTE: This project may not involve all of the above listed subcontractors. Please see the form on the next page which indicates the subcontractors required for this Project.

The list of subcontractors is to be submitted in a separate sealed envelope by completing the form on the next page entitled "Bidder's Identification of Subcontractors". This form provides for the identification of any subcontractors intended to be used in any of the three trades listed above. If bidder intends to use its own forces for any of the above listed work, bidder should so indicate on the form.

Failure to submit the completed form on the next page ("Bidder's Identification of Subcontractors") that includes the names of subcontractors and the agreed upon amounts to be paid to such subcontractors will render the bid non-responsive.

PLEASE NOTE: for any contract that is subject to M/WBE participation goals under Local Law 129, if the bidder's intention to use its own forces to do any of the above-referenced work would result in Bidder's failure to attain the Target Subcontracting Percentage identified in the Subcontractor Utilization Plan, the bid will be non-responsive unless the bidder requests and obtains a Waiver of Target Subcontracting Percentage (Subcontractor Utilization Plan, Part III) in advance of bid submission.

After the low bid is announced, the sealed list submitted by the low bidder will be opened and the names of the subcontractors will be announced. The sealed lists of subcontractors submitted by all other bidders shall be maintained by the Agency unopened unless such bidder shall become the low bidder (e.g., the initial low bidder is found non-responsive). All unopened lists of subcontractors shall be returned to the bidders unopened after contract award, unless the bidder has given the agency permission to shred the form.

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

BIDDER'S IDENTIFICATION OF SUBCONTRACTORS

BID ALTERNATE 2

Project ID: PV467BRAC-R

SUBMISSION: In addition to its Bid (Bid Envelope # 1), the Bidder must, at the time of the bid, complete and submit this form in a separate, sealed envelope (Bid Envelope # 2). To complete this form, the Bidder must identify the subcontractors it intends to use for the work listed below, as well as the dollar amount to be paid to each subcontractor. Failure to complete this form and submit it in a separate, sealed envelope will result in the disqualification of the bid as non-responsive.

The Bidder intends to use the following subcontractors. If the Bidder intends to do any of the work referenced below with its own forces, the Bidder should complete this form using its own name. If multiple subcontractors for any trade are proposed, Bidder may submit multiple copies of this form.

1. PLUMBING CONTRACTOR:

(Print Name)

Agreed Amount To Be Paid To Subcontractor: \$ _____

2. HVAC CONTRACTOR:

(Print Name)

Agreed Amount To Be Paid To Subcontractor: \$ _____

3. ELECTRICAL CONTRACTOR:

(Print Name)

Agreed Amount To Be Paid To Subcontractor: \$ _____

BIDDER'S SIGNATURE: The Bidder must sign this form in the space provided below:

Name of Bidder: _____

By: _____

Signature of Partner or Corporate Officer

Print Name: _____

Title: _____

BIDDER'S IDENTIFICATION OF SUBCONTRACTORS

BID ALTERNATE 3

NOTICE TO BIDDERS

SUBMISSION: The Bidder must, at the time of the bid, submit the form on the next page ("BIDDER'S IDENTIFICATION OF SUBCONTRACTORS"). This form must be submitted in a separate, sealed envelope (BID ENVELOPE #2). Failure to do so will result in the disqualification of the bid as non-responsive.

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

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

NOTE: This project may not involve all of the above listed subcontractors. Please see the form on the next page which indicates the subcontractors required for this Project.

The list of subcontractors is to be submitted in a separate sealed envelope by completing the form on the next page entitled "Bidder's Identification of Subcontractors". This form provides for the identification of any subcontractors intended to be used in any of the three trades listed above. If bidder intends to use its own forces for any of the above listed work, bidder should so indicate on the form.

Failure to submit the completed form on the next page ("Bidder's Identification of Subcontractors") that includes the names of subcontractors and the agreed upon amounts to be paid to such subcontractors will render the bid non-responsive.

PLEASE NOTE: for any contract that is subject to M/WBE participation goals under Local Law 129, if the bidder's intention to use its own forces to do any of the above-referenced work would result in Bidder's failure to attain the Target Subcontracting Percentage identified in the Subcontractor Utilization Plan, the bid will be non-responsive unless the bidder requests and obtains a Waiver of Target Subcontracting Percentage (Subcontractor Utilization Plan, Part III) in advance of bid submission.

After the low bid is announced, the sealed list submitted by the low bidder will be opened and the names of the subcontractors will be announced. The sealed lists of subcontractors submitted by all other bidders shall be maintained by the Agency unopened unless such bidder shall become the low bidder (e.g., the initial low bidder is found non-responsive). All unopened lists of subcontractors shall be returned to the bidders unopened after contract award, unless the bidder has given the agency permission to shred the form.

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

BIDDER'S IDENTIFICATION OF SUBCONTRACTORS

BID ALTERNATE 3

Project ID: PV467BRAC-R

SUBMISSION: In addition to its Bid (Bid Envelope # 1), the Bidder must, at the time of the bid, complete and submit this form in a separate, sealed envelope (Bid Envelope # 2). To complete this form, the Bidder must identify the subcontractors it intends to use for the work listed below, as well as the dollar amount to be paid to each subcontractor. Failure to complete this form and submit it in a separate, sealed envelope will result in the disqualification of the bid as non-responsive.

The Bidder intends to use the following subcontractors. If the Bidder intends to do any of the work referenced below with its own forces, the Bidder should complete this form using its own name. If multiple subcontractors for any trade are proposed, Bidder may submit multiple copies of this form.

1. PLUMBING CONTRACTOR:

(Print Name)

Agreed Amount To Be Paid To Subcontractor: \$ _____

2. HVAC CONTRACTOR:

(Print Name)

Agreed Amount To Be Paid To Subcontractor: \$ _____

3. ELECTRICAL CONTRACTOR:

(Print Name)

Agreed Amount To Be Paid To Subcontractor: \$ _____

BIDDER'S SIGNATURE: The Bidder must sign this form in the space provided below:

Name of Bidder: _____

By: _____

Signature of Partner or Corporate Officer

Print Name: _____

Title: _____

DDC PROJECT #: PV467BRAC-R

PROJECT NAME: BRONX RIVER ART CENTER BUILDING RENOVATION

ATTACHMENT C – REVISIONS TO SPECIFICATIONS

This attachment contains the following revised specification sections:

083510	Folding Doors
220700	Plumbing Insulation
265113	Appendix A Luminaire Schedule

Reference Table of Contents:

The Table of Contents is revised as follows:

Section 083510, Folding Doors is added to the Table of Contents

Section 123200, Manufactured Wood Casework is deleted from the Table of Contents

Reference Section 26 0923 – Architectural Lighting Control Systems:

The article below is included with the specifications.

3.2 COMMISSIONING

- A. Take responsibility for complete and operational lighting control systems that are calibrated to the satisfaction of the Owner, building manager, and occupants.
- B. Factory Rep Inspection: When lighting control systems are completely installed and tested, and final adjustments have been made to the satisfaction of the Contractor, systems shall be inspected by a factory-trained engineer representing the manufacturer, in the presence of the Architect and/or the Owner. Architect shall schedule the inspection. Provide labor and tools as necessary for the inspection and adjustments, whether the inspection is scheduled within or outside of normal working hours, at no additional cost to the Owner. If subsequent inspections are required due to significant failure of the Contractor to meet the requirements of the Specifications, or to prepare adequately for the inspection, Contractor will reimburse Architect for time and expenses, including travel costs, to make any subsequent inspections. Promptly correct any deficiencies found during final inspection.
- C. Control assignment verification: The contractor shall verify that all zones, circuits, addresses and panel assignments of the lighting system meet the specifications, construction documents and Control Intent Narrative.
- D. Initial Calibration: Controls shall be pre-calibrated at the factory by the manufacturer, in the field by the manufacturer's technician, by the Contractor, or in combination, to the initial levels and settings indicated in the contract documents, or by any subsequent instructions provided during the shop drawing phase. If such settings are missing or unclear, the Contractor shall request clarification of the Architect before proceeding with installation. These initial settings shall be completed prior to the final calibration.
- E. Final Calibration / Commissioning: Final adjustments, calibrations and commissioning shall be performed to the Owner's satisfaction, with the presence of the Architect, Lighting Design and Owners representative, Commissioning Agent, Construction Manager, and Manufacturer's Technician. Manufacturer's Factory Representative for the pre-set control systems shall be engaged by the Contractor to participate in up to six (6) hours of assistance with calibration. This shall involve Visit shall be pre-arranged by the Contractor at least three weeks in advance so that the Lighting

Designer, Owner, Cx Agent and Architect can be present for the calibration. If the equipment cannot be calibrated in a timely manner due to incomplete or incorrect work on the part of the Contractor, the Contractor is responsible for additional visits and the associated additional fees of the Manufacturer and design team.

- F. The manufacturer and/or contractor, shall return to the site at least one (1) time in the next year to modify the settings, if requested.
- G. Adjustments to calibrations and setting shall not be modified from those that have been established to meet prerequisites, energy analyses or mandatory provisions of Energy Codes, LEED criteria or credits, or similar base requirements of the project.
- H. The final settings for all lighting controls shall be provided to the Architect and Commissioning Agent within two weeks after calibration, and shall be included in the O&M manual.
- I. Occupancy Sensors – Contractor calibration: Use calibration criteria listed above. Occupancy sensors shall be calibrated to the specified settings prior to move-in. They shall be re-calibrated by the contractor on site if not performing to the satisfaction of the Owner.
- J. Manual: Assemble and submit, in bound 8-1/2"x11" format, an Operation and Maintenance Manual. After approval by the Architect, this manual will be kept on site for reference use by facility maintenance personnel. Transfer of the document will include a thorough walk-through and demonstration of equipment by the Contractor for facility personnel. The Architect shall schedule the transfer. The manual shall include the following:
 - 1. Product technical documents and cut sheets;
 - 2. Manufacturer and product representative contacts; and
 - 3. Operation and calibration instructions for all components included in the installation.
 - 4. Manual shall include as-built drawings from the preset lighting control systems manufacturer as a paper record of the final settings.
 - 5. Final settings and levels selected by the Architect.
- K. Keys: Provide Owner with four (4) sets of keys for every lockable enclosure or cabinet during transfer of Operation and Maintenance Manual.
- L. Training: At the Owner's convenience, the controls manufacturer's factory technician shall provide a maximum of two (2) hours of supplemental expertise and training concerning the installation, characteristics, operations and maintenance of the preset lighting control systems. Such training shall take place after the Contractor has provided the Owner with the maintenance and operation manual mentioned above, and after all systems have been inspected and calibrated, as required above.
- M. Video: The Contractor shall video-tape the training session, and provide the Owner with two (2) copies of the training videotape or CD. Alternative formats are acceptable if mutually agreed upon. If manufacturers' provide videos containing the same information, these may be used. All control products must be represented in visual graphic or animated format.

SECTION 083510

FOLDING DOORS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Basis of Design shall be the drawings and specifications. Work includes the engineering, submittals, manufacturer, erection and all associated work described in these documents and reference documents provided or discussed at the pre-bid conference or following correspondence.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

B. WORK INCLUDED

- 1. Overhead Folding Doors
- 2. Hardware and accessories
- 3. Motor Operation

1.2 RELATED DOCUMENTS

- A. Drawings and general provisions of the contract, including general and supplementary conditions and division 01 specification sections, apply to this Section.

1.3 RELATED SECTIONS

- B. Construction Waste Management and Disposal - Section 017419
- C. Sustainable Design Requirements (LEED Building) - Section 018113
- D. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3

- E. Construction IAQ Requirements - Section 018119
- F. Unit masonry - Section 042000
- G. Masonry Restoration and Cleaning - Section 049000
- H. Miscellaneous Metals Section 055000
- I. Glass and glazing - Section 088000.
- J. Sheet Metal Flashing -- Section 076200
- K. Flexible Flashing - Section 076500
- L. Joints and Sealers - Section 079200
- M. Painting and Finishing - Section 099000.
- N. Breathable Masonry Coating- Section 099200
- O. Work in associated Divisions 21-23, 26-28

1.4 QUALITY ASSURANCE

- A. Wind Loading: Design doors to withstand a 30 lb. per sq. ft. wind loading pressure with a maximum deflection of 1/120 of opening width.
- B. LEED BUILDING Performance Criteria:
The following criteria are REQUIRED for the products included in this section:
 - 1. Metal members shall contain a minimum of 35% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Structural steel shall contain 75%. Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.
 - 2. Metal members fabricated within, and containing raw materials extracted within, 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements above.
 - 3. Adhesives or sealants used for work in this section shall meet the requirements of Section 018113.3 : Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
 - 4. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.

1.5 SUBMITTALS

- A. **Product Data:** Submit manufacturer's product data, roughing-in diagrams, and installation instructions for type and size of folding door. Include manufacturer's operating instructions and maintenance data.
- B. **Shop Drawings:** For the following vertical bi-fold door system components. Include plans, elevations, sections, details, and attachments to other Work.
 - 1. The door manufacturer shall submit for approval all design drawings and complete calculations of all structural, mechanical, electrical and operational features of the doors by a degreed Mechanical Engineer employed by the manufacturer. If required, a registered professional engineer licensed to practice in the project location shall be retained to review and seal the drawings and submittals. Field wiring diagrams, schematic wiring diagrams and physical location of electrical controls drawings shall be provided.
 - 2. Complete calculations shall be submitted with the shop drawings proving that a safety factor of 2 has been used to calculate the size of the doors rollers. To include both reaction and compression- force calculations.
 - 3. Shop drawings shall show layout of Perforated Adhesive Graphic Film on Folding Doors and be fully coordinated with Shop Drawings for Breathable Masonry Coating- Section 099200.
- C. **LEED BUILDING Submittal Requirements:**
The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 - 1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s) and the location (source) of the raw materials used to manufacture the product(s)
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
 - 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.

3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

1.6 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation, and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

1.7 WARRANTIES

- C. Provide written warranty, signed by manufacturer, agreeing to repair or replace work that exhibits defects in materials or workmanship. "Defects" is defined to include, but not limited to, leakage of water, abnormal aging or deterioration, abnormal deterioration or fading of finishes, and failure to perform as required. Include requirement for removal and replacement of covering and connected adjacent work.
 1. Warranty Period: Three (3) years from date of Substantial Completion; except finish shall be warranted for a period of fifteen (15) years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Provide folding door assemblies "Premier" manufactured by Wilson, Schweiss, Crown Industries Inc, or approved equal.
- B. Perforated Adhesive Graphic Film
 - a. 3m Scotchcal Perforated Window Graphic Film
 - b. Flexcon Seethru-Sign STSWBF2
 - c. Mactac IMAGin JT5916P Perforated one-way Visibility Film
 - d. Or approved equal

2.2 MATERIALS

- A. Door framework shall be 6061-T6 aluminum. Finish custom as selected by Commissioner.
- B. Glazing- see Glass and glazing - Section 088000
- C. Door hardware to include:
 - 1. Leaf type stainless steel hinges with stainless steel pins.
 - 2. Bottom Seal: Space between door frame and finished floor sealed with 12" rubber seal.
 - 3. Commercial grade 2-button, wall mounted.
 - 4. Three (3) hand held remote operators.
 - 5. Emergency back-up power unit.
 - 6. Coordinate provision for saddle.
 - 7. Provide tail/whip with future switching from central location.
- D. Provide with electric eye photo sensors and door base safety edge.

2.3 STRUCTURAL MATERIALS

- A. Structural Aluminum tubing shapes: Aluminum Association
- B. Steel Tubing or Pipe: ASTM A 500, Grade B; ASTM A 501; or ASTM A 53, Grade B.
- D. High-Strength Bolts, Nuts, and Washers: SAE J429-Grade 5, heavy hex steel structural bolts, heavy hex carbon-steel nuts, and hardened carbon-steel washers.
 - 1. Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50.
 - 2. Direct-Tension Indicators: ASTM F 959, Type 325 or Type 490.
 - a. Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50, epoxy coated.

2.4 FABRICATION, GENERAL

- A. Door Panel Construction:

1. Door panel construction shall be 6061-T6 architectural aluminum tubing manufactured in the United States. The sizes and number of members will be determined by the door size, wind load and the door's covering. The smallest tube used in ANY application however is 3 inch by 3 inch.
 2. If a pass door is required in the bottom panel, a framed opening will be provided to install the door (door by others). The bottom threshold will be ADA-compliant, yet still provide structural integrity to tie the frame members together. Manufacturer must provide documentation that they have completed a project with this design requirement. Shop drawings and customer reference must be provided for verification.
 3. Door members in sizes suitable for convenient shipping shall be bolted and/or welded construction. Joints shall develop 100 percent of the strength of the framing members. The sections and framing members of which they are composed shall be true to dimension and square in all directions and shall not be out of line more than 1 1/4 inch in 20 feet. Vertical and horizontal members adjacent to each other and/or being joined together in the field shall be accurately prepared to facilitate field assembly. All field connections shall be bolt-together. Field connections requiring welding are not acceptable. Full depth members spaced vertically shall be provided for proper lateral support of inside and outside flanges for all main members.
 4. Door panel rollers shall be self-aligning, high-load capacity track rollers. The rollers shall be double-bearing and enclosed. Wheels not enclosed or "outrigger" wheels are unacceptable. Rollers must also incorporate a Posi-Lock™ wind lock device to keep the rollers on the track face in the event of a sudden gust of wind.
 5. Fabrication of door sections shall be done in jigs so as to hold the sections to specified tolerances. Exposed welds and welds, which interfere with the installation of various parts, such as exterior panels and liner panels, etc., shall be ground smooth.
 6. Welders employed to weld the frame together shall be certified welders. Documentation of their certification and written assurance that said employees will fabricate the door system shall be submitted with drawings and calculations.
- B. Weathering: Material, which is adjustable and readily replaceable, shall be provided at all necessary vertical edges, heads and sills to afford a substantially weather-tight installation.
1. Material on the sill and bottom of the door shall be .075 inch thick EPDM fabric insert sheet rubber. Weathering on the bottom of the door shall be retained continuously by aluminum keeper angle for its full

length and secured with rust resistant fasteners on twelve (12) inch centers. Vinyl fabric is not acceptable.

2. Vertical weather-stripping at the jambs shall be attached to the door with an acrylic PSA adhesive that is resilient in temperatures from 200 degrees Fahrenheit to -20 degrees Fahrenheit. The material shall be EPDM SC-42, .5 inches thick.
 3. Weathering shall be properly fitted and adjusted to close all openings. It shall be sized and cut at the factory.
- C. Drive shaft and lifting cables: Mechanism for which the door is safely and efficiently lifted and lowered.
1. The drive shaft shall be galvanized Sch 40 pipe and have a minimum O.D. of 2 ½. The drive shaft drums shall be galvanized and be, at a minimum, 3 inches in diameter. The drums must be an integral part of the drive shaft—welded into place. A drive shaft of solid bar stock is unacceptable.
 2. The drive shaft is to be mounted above the lintel of the door, inside the building. The shaft must run continuously and be as wide as the width of the door panel. The shaft will run through sealed bearings with Zerk fittings to allow for easy lubrication.
 3. Pick up cables shall be numerous and large enough to provide a 5 to 1 safety factor. The cables shall be 3/16-in thick galvanized aircraft cable. The lift cables cannot be threaded through pulleys, but fastened directly to fixed bottom door pick-up points. Lift straps are not acceptable.
- D. Automatic locks: automatically lock and unlock the door with a momentary push of a button. Only two types of locking mechanisms shall be acceptable:
1. Linear actuators: electrically driven actuators that positively lock and unlock the door through a electrical signal from the control box. Actuators lock and unlock the door by simply momentarily pushing one button on the control station.
 2. Magnetic locks: Strong Magni-Lock™ magnetic lock provides clean, secure locking and unlocking of the vertical bi-fold door. Along with the powerful locking system, a stainless steel assist handle shall be provided.
 3. With either locking system, the door shall come equipped with thru-beam photo eyes. Reflective photo eyes are not acceptable. The photo eyes will be pre-set and tested at the factory. The door system's operating program will be written such that, if the photo eyes beam is broken, the door reverses and stays in the open position until physically reset. No other logic is acceptable.

- E. Power Operator: All electrical components must be manufactured in the United States and designed to meet National Electric Code (NEC) Section 513. Standard voltage shall be 230 Volt, single-phase (other voltage available).
1. The power drive units shall consist of a gearhead motor with high-speed shaft brake. The necessary roller chains, sprockets, take-up devices necessary to drive the door shall be provided.
 2. Each system shall be provided with a manual release system to allow the door to be raised and lowered in the event of a power outage.
 3. The drive motor(s) shall be induction type, sized to operate the door under zero wind load conditions at not more than 75% of their rated capacity; motors shall be rated for door operation duty and shall be normal starting torque type. They shall be wound for service converted by the drive at 230 volt, three-phase, 60 hertz.
 4. The gear reduction units shall be of the highest quality, worm gear single-reduction of commercial manufacture and shall have internal continuous lubrication. The units shall be of a type which allows a reversal of effort through the gears without damage to the gears. The gears shall be non-self-locking and be rated AGMA standard.
 5. The high speed shaft bakes shall be integral with the motors and shall be the spring set magnetic solenoid release disc type with an auxiliary auto-resetting manual release. Plunger and lever brake mechanics are unacceptable.
- F. Electrical Controls: The door manufacturer shall furnish the doors with the proper electrical equipment and controls, built in accordance with the latest NEMA Standards. All equipment, power and control circuits shall be installed in accordance with the National Electrical Code, Standard No. 70, and the requirements of authority having jurisdiction. Any equipment located eighteen (18) inches or less above the floor shall be explosion proof.
1. Ascent TM variable-speed AC-Drive shall be enclosed in a NEMA 12-rated enclosure with a circuit-breaker type disconnect and shall be factory wired, tested and equipped with overload and undervoltage protection, electrical interlocks, relays, timing devices and transformers for the control circuits. A wiring diagram shall be placed on the inside of each enclosure cover.
 2. The Ascent AC-Drive slowly starts the door and then increases the speed of the door after its initial start up. At the top of the door's stroke, the Ascent Drive slows the door until it stops and only then does the brake engage.

The programmable Zelio logic controller controls the sequence of the door's operation and is synced with the Ascent AC-Drive.

No other means of slowing the door down and speeding the door up will be acceptable including mechanical means.

3. The door shall be controlled by a momentary pressure 3-button push button station, mounted on an accessible interior location inside the building for a safe operable condition. Open/Close/Stop buttons allow the door to be opened, closed and stopped, anywhere in the door's travel, with a momentary touch of a button. All interior push buttons shall be in a small, low-profile, easily-accessible NEMA 12 enclosure. The main control box shall be remotely located up and out of the way.
 4. Limit switches shall be provided to stop the travel of the doors in their fully opened or fully closed positions. The limit switches shall be positive acting snap action type with actuating cams designed with sufficient overtravel to permit the door to come to a complete stop without over traveling the limit switches. The limit switches shall be coupled directly to the gearbox for positive positioning and stopping.
 5. Door shall also feature an upper override disconnect. This mechanical upper limit provides redundancy that shuts the door off in the unlikely event the door's upper limit does not stop the door.
 6. All electrical components shall be programmed, wired and tested at the factory.
 7. Hollow metal personnel door interlocks shall be provided. Interlock shall prevent motor operation of the hangar door group when the personnel door is open.
 8. A host of operation options are available including, but not limited to radio control, key-operation, card-swipe and key-pad. The door can also be tied electrically to the buildings security or fire system.
- G. All Components: Are galvanized, zinc plated or cadmium coated to resist corrosion.
- H. Electrical Wiring and Source of Power: All conduit and fittings, flexible multiconductor cables, junction boxes, and all labor to wire and connect to and between all electrical equipment on the doors shall be installed in accordance with the door manufacturer's approved wiring diagrams and drawings by the electrical contractor.

1. If permanent electrical power is not available when the doors are installed, the electrical contractor shall obtain a temporary source of electrical power so the doors may be tested and adjusted under power.
2. The door manufacturer's wiring diagrams shall include a complete control box schematic wiring diagram and a physical location drawing showing the connection points on the door.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of the vertical bi-fold door system.
 1. For the record, prepare written report, listing conditions detrimental to performance of work.
 2. Proceed with erection only after unsatisfactory conditions have been corrected.

3.2 ERECTION

- A. Do not field cut, drill, or alter structural members without written approval from the hangar door manufacturer's engineer.
- B. Vertical Bi-fold door shall be erected when opening has been prepped and dimensions verified.
- C. All vertical bi-fold doors and accessories shall be assembled in strict accordance with the approved shop and erection drawings. The doors shall be installed by a factory-certified installation crew who shall be responsible for proper and satisfactory operation.

3.3 INSPECTION AND TESTING

- A. Inspection of the vertical bi-fold door installation will be made after erection is complete. Any defects disclosed by the test shall be corrected by the door manufacturer and the installation delivered in and acceptable operable condition.

END OF SECTION

FMS No.-PV467 - BRAC
June 10, 2013
Addendum 1

SECTION 220700

PLUMBING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Insulation Materials:
 - a. Cellular glass.
 - b. Mineral fiber.
- 2. Insulating cements.
- 3. Adhesives.
- 4. Factory-applied jackets.
- 5. Field-applied jackets.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).
- B. Shop Drawings:
 - 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.
 - 8. Detail field application for each equipment type.

- C. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use. Sample sizes are as follows:

1. Sample Sizes:

- a. Preformed Pipe Insulation Materials: 12 inches long by NPS 2.
- b. Sheet Form Insulation Materials: 12 inches square.
- c. Jacket Materials for Pipe: 12 inches long by NPS 2.
- d. Sheet Jacket Materials: 12 inches square.
- e. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

- D. Qualification Data: For qualified Installer.

- E. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction 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.

- F. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

- B. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.6 COORDINATION

- A. Coordinate size and location of supports, hangers, and insulation shields specified in Section "Hangers and Supports."
- B. Coordinate clearance requirements with piping Installer for piping insulation application and equipment Installer for equipment 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.

1.7 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.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Cell-U-Foam Corporation; Ultra-CUF.
 - b. Pittsburgh Corning Corporation; Foamglas Super K.

c. Knauf Insulation

2. Block Insulation: ASTM C 552, Type I.
3. Special-Shaped Insulation: ASTM C 552, Type III.
4. Board Insulation: ASTM C 552, Type IV.
5. Preformed Pipe Insulation without Jacket: Comply with ASTM C 552, Type II, Class 1.
6. Preformed Pipe Insulation with Factory-Applied ASJ: Comply with ASTM C 552, Type II, Class 2.
7. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.

G. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type I. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. CertainTeed Corp.; Duct Wrap.
 - b. Johns Manville; Microlite.
 - c. Knauf Insulation; Duct Wrap.
 - d. Manson Insulation Inc.; Alley Wrap.
 - e. Owens Corning; All-Service Duct Wrap.

H. Mineral-Fiber, Preformed Pipe Insulation:

1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Fibrex Insulations Inc.; Coreplus 1200.
 - b. Johns Manville; Micro-Lok.
 - c. Knauf Insulation; 1000(Pipe Insulation.
 - d. Manson Insulation Inc.; Alley-K.
 - e. Owens Corning; Fiberglas Pipe Insulation.
2. Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

I. Mineral-Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semirigid board material with factory-applied FSK jacket complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB. Nominal density is 2.5 lb/cu. ft. or more. Thermal conductivity (k-value) at 100 deg F is 0.29 Btu x in./h x sq. ft. x deg F or less. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:

- a. CertainTeed Corp.; CrimpWrap.
- b. Johns Manville; MicroFlex.
- c. Knauf Insulation; Pipe and Tank Insulation.
- d. Manson Insulation Inc.; AK Flex.
- e. Owens Corning; Fiberglas Pipe and Tank Insulation.

2.2 INSULATING CEMENTS

A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.

- 1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Insulco, Division of MFS, Inc.; SmoothKote.
 - b. P. K. Insulation Mfg. Co., Inc.; PK No. 127, and Quik-Cote.
 - c. Rock Wool Manufacturing Company; Delta One Shot.

B. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.

- 1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Insulco, Division of MFS, Inc.; SmoothKote.
 - b. P. K. Insulation Mfg. Co., Inc.; PK No. 127, and Quik-Cote.
 - c. Rock Wool Manufacturing Company; Delta One Shot.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

- 1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Childers Products, Division of ITW; CP-82.
 - b. Foster Products Corporation, H. B. Fuller Company; 85-20.
 - c. ITW TACC, Division of Illinois Tool Works; S-90/80.
 - d. Marathon Industries, Inc.; 225.
 - e. Mon-Eco Industries, Inc.; 22-25.

2.4 MASTICS

- A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.
- B. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.
1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Childers Products, Division of ITW; CP-35.
 - b. Foster Products Corporation, H. B. Fuller Company; 30-90.
 - c. ITW TACC, Division of Illinois Tool Works; CB-50.
 - d. Marathon Industries, Inc.; 590.
 - e. Mon-Eco Industries, Inc.; 55-40.
 2. Water-Vapor Permeance: ASTM E 96, Procedure B, 0.013 perm at 43-mil dry film thickness.
 3. Service Temperature Range: Minus 20 to plus 180 deg F.
 4. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.
 5. Color: White.
- C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below ambient services.
1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Childers Products, Division of ITW; CP-30.
 - b. Foster Products Corporation, H. B. Fuller Company; 30-35.
 - c. ITW TACC, Division of Illinois Tool Works; CB-25.
 - d. Marathon Industries, Inc.; 501.
 - e. Mon-Eco Industries, Inc.; 55-10.
 2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 35-mil dry film thickness.
 3. Service Temperature Range: 0 to 180 deg F.
 4. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
 5. Color: White.
- D. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below ambient services.
1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Childers Products, Division of ITW; Encacel.
 - b. Foster Products Corporation, H. B. Fuller Company; 60-95/60-96.
 - c. Marathon Industries, Inc.; 570.
 - d. Mon-Eco Industries, Inc.; 55-70.

2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
3. Service Temperature Range: Minus 50 to plus 220 deg F.
4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
5. Color: White.

E. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.

1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Childers Products, Division of ITW; CP-10.
 - b. Foster Products Corporation, H. B. Fuller Company; 35-00.
 - c. ITW TACC, Division of Illinois Tool Works; CB-05/15.
 - d. Marathon Industries, Inc.; 550.
 - e. Mon-Eco Industries, Inc.; 55-50.
2. Water-Vapor Permeance: ASTM F 1249, 3 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 200 deg F.
4. Solids Content: 63 percent by volume and 73 percent by weight.
5. Color: White.

2.5 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.

1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Childers Products, Division of ITW; CP-52.
 - b. Foster Products Corporation, H. B. Fuller Company; 81-42.
 - c. Marathon Industries, Inc.; 130.
 - d. Mon-Eco Industries, Inc.; 11-30.
2. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over equipment and pipe insulation.
3. Service Temperature Range: Minus 50 to plus 180 deg F.
4. Color: White.

2.6 SEALANTS

A. Joint Sealants:

1. Joint Sealants for Cellular-Glass, Phenolic, and Polyisocyanurate Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Childers Products, Division of ITW; CP-76.

- b. Foster Products Corporation, H. B. Fuller Company; 30-45.
- c. Marathon Industries, Inc.; 405.
- d. Mon-Eco Industries, Inc.; 44-05.
- e. Pittsburgh Corning Corporation; Pittseal 444.
- f. Vimasco Corporation; 750.

B. FSK and Metal Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Childers Products, Division of ITW; CP-76-8.
 - b. Foster Products Corporation, H. B. Fuller Company; 95-44.
 - c. Marathon Industries, Inc.; 405.
 - d. Mon-Eco Industries, Inc.; 44-05.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: Aluminum.

2.7 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 C 1136, Type I.
 2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
 3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
 4. PVDC Jacket for Indoor Applications: 4-mil- thick, white PVDC biaxially oriented barrier film with a permeance at 0.02 perms when tested according to ASTM E 96 and with a flame-spread index of 5 and a smoke-developed index of 20 when tested according to ASTM E 84.
 5. PVDC-SSL Jacket: PVDC jacket with a self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip.

2.8 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, 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. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Johns Manville; Zeston.
 - b. P.I.C. Plastics, Inc.; FG Series.
 - c. Proto PVC Corporation; LoSmoke.
 - d. Speedline Corporation; SmokeSafe.
2. Adhesive: As recommended by jacket material manufacturer.
3. Color: Color-code jackets based on system.
4. 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.
5. Factory-fabricated tank heads and tank side panels.

C. Metal Jacket:

1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Childers Products, Division of ITW; Metal Jacketing Systems.
 - b. PABCO Metals Corporation; Surefit.
 - c. RPR Products, Inc.; Insul-Mate.
2. Aluminum Jacket: Comply with ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105 or 5005, Temper H-14.
 - a. Factory cut and rolled to size.
 - b. Finish and thickness are indicated in field-applied jacket schedules.
 - c. Moisture Barrier for Indoor Applications: 1-mil- thick, heat-bonded polyethylene and kraft paper.
 - d. Moisture Barrier for Outdoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper 2.5-mil- thick Polysurlyn.
 - e. Factory-Fabricated Fitting Covers:
 - 1) Same material, finish, and thickness as jacket.
 - 2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
 - 3) Tee covers.
 - 4) Flange and union covers.
 - 5) End caps.
 - 6) Beveled collars.
 - 7) Valve covers.
 - 8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

- D. Underground Direct-Buried Jacket: 125-mil- thick vapor barrier and waterproofing membrane consisting of a rubberized bituminous resin reinforced with a woven-glass fiber or polyester scrim and laminated aluminum foil.

2.9 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0835.
 - b. Compac Corp.; 104 and 105.
 - c. Ideal Tape Co., Inc., an American Biltrite Company; 428 AWF ASJ.
 - d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
2. Width: 3 inches.
3. Thickness: 11.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

- B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
 - b. Compac Corp.; 110 and 111.
 - c. Ideal Tape Co., Inc., an American Biltrite Company; 491 AWF FSK.
 - d. Venture Tape; 1525 CW, 1528 CW, and 1528 CW/SQ.
2. Width: 3 inches.
3. Thickness: 6.5 mils.
4. Adhesion: 90 ounces force/inch in width.
5. Elongation: 2 percent.
6. Tensile Strength: 40 lbf/inch in width.
7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

2.10 SECUREMENTS

- A. Bands:

1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Childers Products; Bands.
 - b. PABCO Metals Corporation; Bands.
 - c. RPR Products, Inc.; Bands.
2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304; 0.015 inch thick, 1/2 inch wide with wing or closed seal.
3. Aluminum: ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 inch wide with wing or closed seal.
4. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.

B. Insulation Pins and Hangers:

1. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
 - a. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - 1) AGM Industries, Inc.; Tactoo Insul-Hangers, Series T.
 - 2) GEMCO; Perforated Base.
 - 3) Midwest Fasteners, Inc.; Spindle.
 - b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
 - c. Spindle: Stainless steel, fully annealed, 0.106-inch- diameter shank, length to suit depth of insulation indicated.
 - d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick, galvanized-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
 - a. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - 1) AGM Industries, Inc.; RC-150.
 - 2) GEMCO; R-150.
 - 3) Midwest Fasteners, Inc.; WA-150.
 - 4) Nelson Stud Welding; Speed Clips.

- b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.
- 3. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
- C. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.
- D. Wire: 0.080-inch nickel-copper alloy soft-annealed, stainless steel.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
 - a. C & F Wire.
 - b. Childers Products.
 - c. PABCO Metals Corporation.
 - d. RPR Products, Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
 - 1. Verify that systems and equipment to be insulated have been tested and are free of defects.
 - 2. Verify that surfaces to be insulated are clean and dry.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment and piping including fittings, valves, and specialties.

- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment and 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, soften, or otherwise attack insulation or jacket in either wet or dry state.
- 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. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- 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 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.
 - 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.
 - 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, 4 inches o.c.
 - a. For below ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape as recommended by insulation material manufacturer 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 more than 75 percent of its nominal thickness.
- 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 similar 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. Manholes.
 5. Handholes.
 6. Cleanouts.

3.4 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
1. Seal penetrations with flashing sealant.
 2. 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.
 3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
 4. Seal jacket to roof flashing with flashing sealant.
- 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. Seal penetrations with flashing sealant.
 2. 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.
3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
 4. Seal jacket to wall flashing with flashing sealant.
- 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.
- F. Insulation Installation at Floor Penetrations:
1. Pipe: Install insulation continuously through floor penetrations.
 2. Seal penetrations through fire-rated assemblies.

3.5 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.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be 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 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 used for adjacent pipe. Overlap adjoining pipe insulation by not less than two 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 two 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 and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 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. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. 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 shall conform 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 adjoining pipe insulation.
 2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two 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.

3.6 CALCIUM SILICATE INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure single-layer insulation with stainless-steel bands at 12-inch intervals and tighten bands without deforming insulation materials.
2. Install 2-layer insulation with joints tightly butted and staggered at least 3 inches. Secure inner layer with wire spaced at 12-inch intervals. Secure outer layer with stainless-steel bands at 12-inch intervals.
3. Apply a skim coat of mineral-fiber, hydraulic-setting cement to insulation surface. When cement is dry, apply flood coat of lagging adhesive and press on one layer of glass cloth

or tape. Overlap edges at least 1 inch. Apply finish coat of lagging adhesive over glass cloth or tape. Thin finish coat to achieve smooth, uniform finish.

B. Insulation Installation on Pipe Flanges:

1. Install preformed 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 block insulation of same material and thickness as pipe insulation.
4. Finish flange insulation same as pipe insulation.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When preformed insulation sections of insulation are not available, install mitered sections of calcium silicate insulation. Secure insulation materials with wire or bands.
3. Finish fittings insulation same as pipe insulation.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install mitered segments of calcium silicate insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
2. Install insulation to flanges as specified for flange insulation application.
3. Finish valve and specialty insulation same as pipe insulation.

3.7 CELLULAR-GLASS INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of 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 factory-applied jackets on above ambient services, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below ambient services, do not staple longitudinal tabs but 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 Flanges:

1. Install preformed 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 cellular-glass block insulation of same thickness as pipe insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of cellular-glass insulation to valve body.
2. 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.

3.8 MINERAL-FIBER INSULATION INSTALLATION

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 factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but 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 Flanges:

1. Install preformed 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 mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as 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.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered 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 FIELD-APPLIED JACKET INSTALLATION

A. Where FSK/ASJ 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 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 FINISHES

A. Equipment and Pipe Insulation with FSK/ASJ or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in painting Sections.

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. 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 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
 - 1. Inspect field-insulated equipment, randomly selected by Commissioner, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each type of equipment. For large equipment, remove only a portion adequate to determine compliance.
 - 2. Inspect pipe, fittings, strainers, and valves, randomly selected by Commissioner, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.
- D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.12 PIPING INSULATION SCHEDULE, GENERAL

- A. 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.
- B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 - 1. Drainage piping located in crawl spaces.
 - 2. Underground piping.
 - 3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.13 INDOOR PIPING INSULATION SCHEDULE

- A. Domestic Cold Water:
 - 1. NPS 1 (DN 25) and Smaller: Insulation shall be:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
 - 2. NPS 1-1/4 (DN 32) and Larger: Insulation shall be:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1-1/2 inches thick.
- B. Domestic Hot Water:

1. NPS 1-1/4 (DN 32) and Smaller: Insulation shall be:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1-1/2 inches thick.
 2. NPS 1-1/2 (DN 40) and Larger: Insulation shall be:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 2 inch thick.
- C. Stormwater and Overflow:
1. All Pipe Sizes: Insulation shall be:
 - a. Cellular Glass: 1-1/2 inches thick.
- D. Roof Drain and Overflow Drain Bodies:
1. All Pipe Sizes: Insulation shall be:
 - a. Cellular Glass: 1-1/2 inches thick.
- E. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities:
1. All Pipe Sizes: Insulation shall be:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
- F. Condensate and Equipment Drain Water below 60 Deg F:
1. All Pipe Sizes: Insulation shall be:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
- G. Floor Drains, Traps, and Sanitary Drain Piping within 10 Feet of Drain Receiving Condensate and Equipment Drain Water below 60 Deg F:
1. All Pipe Sizes: Insulation shall be:
 - a. Cellular Glass: 1-1/2 inches thick.
- H. Hot Service Drains:
1. All Pipe Sizes: Insulation shall be:
 - a. Mineral-Fiber, Preformed Pipe, Type I or II: 1-1/2 inches thick.
- I. Hot Service Vents:
1. All Pipe Sizes: Insulation shall be:
 - a. Mineral-Fiber, Preformed Pipe, Type I or II: 1-1/2 inches thick.

3.14 UNDERGROUND, FIELD-INSTALLED INSULATION JACKET

- A. For underground direct-buried piping applications, install underground direct-buried jacket over insulation material.

END OF SECTION 22 07 00

THIS PAGE INTENTIONALLY LEFT BLANK

C6	Gallery C, Restroom	6" aperture recessed CFL downlight with opal acrylic lens, white cone, white flange, and integral electronic ballast. Dimensions: 6" aperture, 12-3/4" length, 10" width, 6" height	1	32 watt Triple Tube compact fluorescent, 3000K	Integral electronic ballast	36	ea	Lightrider Calcilite Lensed Downlight 8091 DWHW /S6132BU 32W	1. See Common Note 9 below.	Cooper Portfolio, Edison Price, or approved equal
C8	Stairs, Restrooms, Hallways, Workshops	Surface mounted vapor-tight "jelly jar" with guard, natural aluminum or painted fixture finish and integral electronic ballast. Mounted to wall so that globe is horizontal. Suitable for recessed junction boxes. Low Wattage label required "20W maximum". Finish to be selected by Commissioner.	1	Screw-based 1200 lumen self-ballasted 20W spiral compact fluorescent, 3000K; OSI CF20EL/Mirco/8 30/ECO	Lamp with Integral electronic ballast	20	ea	RAB VC100 G - finish	1. Fixture shall be mounted so that bottom of fixture is at 6'-8" AFF or higher. 2. See Common Notes 9, 11 below. 3. Interior wattage limit label for 20 Watts Max. 4. Owner to consider LED retrofit lamp in future when technology is suitable for enclosed fixtures	Sionco, Canlet, Abolite, or approved equal
C8A	Stairs, Restrooms, Hallways, Workshops	Same as C8 except with integral surface mounted junction box, for locations where junction boxes cannot be recessed. Low Wattage label required "20W maximum".	1	Screw-based 1200 lumen self-ballasted 20W spiral compact fluorescent, 3000K; OSI CF20EL/Mirco/8 30/ECO	Lamp with Integral electronic ballast	20	ea	RAB VX100 G - finish	1. Fixture shall be mounted so that bottom of fixture is at 6'-8" AFF or higher. 2. See Common Notes 9, 11 below. 3. Interior wattage limit label for 20 Watts Max. 4. Owner to consider LED retrofit lamp in future when technology is suitable for enclosed fixtures	Sionco, Canlet, Abolite, or approved equal
C9	Gallery C	Wall surface mounted CFL decorative sconce with hand-blown white opal glass diffuser, powder coat white aluminum finish, and integral electronic ballast. Dimensions: 13.7" diameter, 4.2" extension	1	18 watt Triple Tube compact fluorescent, 3000K	Integral electronic ballast	20	ea	Louis Poulsen AJ Eklipia Wall - AJE-13.7" -1/18W/CF GX24q-2-VOLTS-WHT-WALL	1. Fixture shall be mounted so that bottom of fixture is at 6'-8" AFF or higher. 2. See Common Notes 9, 11 below.	Bega, Artemide, or approved equal
F1/TR	Gallery A	Pendant mounted track with extruded housing modified to include fluorescent uplight and integral electronic dimming ballast. Housing shall have 1 circuit track below, WHITE finish, and stainless steel cable mounting with gray cord. Track shall be available with bridge, outlet, and weight hanger support accessories as required. Dimensions: Continuous lengths as shown on drawings, 2-1/32" width, 3-3/16" height	1	32 watt Super T8 fluorescent, 3000K, per 4' length	Fluorescent shall have integral electronic ballast, track shall be 120/250 volt	7 watts (fluorescent) 30 watts (track allowance - exempt in galleries)	If	LSI Unitrack 5037*-MOD T8 UPLIGHT/50315/313*0	1. Fixture shall be mounted so that bottom of fixture is at 10" AFF and aligns with ceiling fan blades. Contractor to coordinate cable/stem lengths. 2. Fixture types M1 and H3 shall mount to track. 3. Fixture shall utilize 4' fluorescent lamps only. 4. Provide 5% dimming ballast for fluorescents. Track shall not dim. 5. See Common Notes 5, 6, 8, 9, 10, 11 below.	Edison Price, LiteLab, Axis, Systemalux, or approved equal

F1/ TRIA	Gallery C	Identical to TR1/F1 except with 2 circuit track.	1	32 watt Super T8 fluorescent, 3000K, per 4' length	Fluorescent shall have integral electronic NEMA Premium 5% dimming ballast; track shall be 120/250 volt	7 watts (fluorescent) 60 watts (2- circuit track allowance - exempt in galleries)	if	LSI Unirack 5037*-MOD T8 UPLIGHT/50315/323*0	1. Fixture shall be mounted so that bottom of fixture is at 10" AFF and aligns with ceiling fan blades. Contractor to coordinate cable/stem lengths. 2. Fixture types M1 and H3 shall mount to track. 3. Fixture shall utilize 4' T8 fluorescent lamps only. 4. Provide 5% dimming ballast for fluorescents. Track shall not dim. 5. See Common Notes 5, 6, 8, 9, 10, 11 below.	Edison Price, LiteLab, Axis, Systemlux or approved equal
F3	Lease Space and Studios	Suspended linear fluorescent up/down light with white perforated reflector, white finish, and integral electronic ballast. Fixture shall be circuited for bi- level switching. Cable suspension with gray power cord at interior end of each row. Dimensions: Continuous lengths as shown on drawings in 4' or 8' housing lengths, and 4' diffuser lengths, 9-3/4" width, 5-3/8" height	2	32 watt Super T8 fluorescent, 3000K, per 4' length	Integral electronic NEMA Premium ballast	56	ea	Cooper - Metalux Basix Perf Arch BSX-R-PA-2-32T8-VOLTS*- NEMA PREMIUM-8-2.*	1. Fixture shall be mounted so that bottom of fixture is at 8'-3" AFF in lease space and 9'-0" in studios: verify with Architect so that bottom of fixture aligns with ceiling fan blades. Contractor to coordinate cable/stem lengths. 2. Fixture shall be wired for bi-level switching. 3. See Common Notes 8 and 9 below.	Legion Lighting, Prudential Lighting, or approved equal
F4	Workshops, Lobbies, Hallway	Pendant-mounted 4' diameter dome with acrylic diffuser, textured matte white painted fixture finish, perforated top for uplight, and integral electronic ballasts. Fixture shall be suspended with aircraft cable assembly and gray cord. Fixture shall be circuited for bi-level switching. Dimensions: 4' diameter, 4'-1/8" depth.	6	25 watt (3') T8 fluorescent, 3000K	Integral electronic ballasts	168	ea	Prudential Lighting P-3940-6T8-WA-TMW-DC- VOLTS-CA48-10%UPLT	1. Fixture shall be wired for bi-level switching. 2. Fixture shall be mounted so that bottom of fixture is at 9'-0" AFF and aligns with fan blades, except on 1st floor where bottom of fixture shall be at 10'-0" AFF. Contractor to coordinate cable/stem lengths. 3. See Common Note 6, 8, 9, 11 below.	LiteControl, Focal Point Lighting, or approved equal
F6B	Offices and Computer Lab	Pendant mounted two-lamp up/down light with frosted acrylic lens downlight, with 70% uplight, 30% downlight distribution, white painted fixture finish, dust cover, and integral electronic NEMA Premium ballast. Fixture shall be suspended with aircraft cable and gray cord mounting option. Dimensions: Continuous lengths as shown on drawings in modules of 4' lamp lengths; 6-1/2" width, 1-1/2" height. Fixture shall be wired for bi- level switching. Dimensions: 8' length, 6-1/2" width, 1-1/2" height.	4	32 watt Super T8 fluorescent, 3000K	Integral electronic NEMA Premium ballast	112	ea	Axis Lighting Cubic Narrow CUB-F-8-T8-2-W-**-NEMA PREMIUM-VOLTS-2-CA#*-D	1. Fixture shall be mounted so that bottom of fixture is at 8'-0" AFF in offices and 9'-0" AFF in computer lab, and so that bottom of fixture aligns with ceiling fan blades. 2. Contractor to coordinate cable/stem lengths. 3. Fixture shall be wired for bi-level switching. 3. See Common Notes 8, 9, 11 below.	Focal Point Lighting, Lite Control, or approved equal

F6C	Offices	Identical to F6B except 4' length. Dimensions: 4' length, 6-1/2" width, 1-1/2" height	2	32 watt Super T8 fluorescents, 3000K	Integral electronic NEMA Premium ballast	56	ea	Axis Lighting Cubic Narrow CUB-F-4-T8-2-W-**-NEMA PREMIUM-VOLTS-2-CA#-*-D	1. Fixture shall be mounted so that bottom of fixture is at 8'-0" AFF and aligns with ceiling fan blades. Contractor to coordinate cable/stem lengths. 2. Fixture shall be wired for bi-level switching and tandem wiring to adjacent 4' fixture if 2 zones are indicated on dwgs. 3. See Common Notes 8, 9, 11 below.	Focal Point Lighting, Lit Control, or approved equal
F6D	Computer Lab	Identical to F6B except 12' length. Dimensions: 12' length, 6-1/2" width, 1-1/2" height	6	32 watt Super T8 fluorescents, 3000K	Integral electronic NEMA Premium ballast	168	ea	Axis Lighting Cubic Narrow CUB-F-12-T8-2-W-**-NEMA PREMIUM-VOLTS-2-CA#-*-D	1. Fixture shall be mounted so that bottom of fixture is at 9'-0" AFF and aligns with ceiling fan blades. Contractor to coordinate cable/stem lengths. 2. Fixture shall be wired for bi-level switching. 3. See Common Notes 8, 9, 11 below.	Focal Point Lighting, Lit Control, or approved equal
F8	Restrooms	Recessed linear fluorescent continuous end-to-end wall slot with open bottom, shielded lamp, semi-specular parabolic reflector, integral electronic NEMA Premium ballast and straight extensions. Dimensions: Continuous lengths as shown on drawings, 13-1/2" width, 12-3/4" height/depth. 4' lamps only.	1	32 watt Super T8 fluorescent, 3000K, per 4' length	Integral electronic NEMA Premium ballast	7	If	LiteControl Wall Slot 2000 20-1-LENGTH-T8-CWM-NEMA PREMIUM-PR-VOLTS-SE	1. See Common Notes 6, 8, 10 below. 2. Continuous wall to wall. Center lighted portion in opening. Submit layout. Wall shall be finished above ceiling line.	Focal Point Lighting, Linear Lighting, or approved equal
F9	Closets	Wall surface mounted linear fluorescent with satin acrylic lens and integral electronic NEMA Premium ballast. Dimensions: 4' length, 2-1/4" width, 3" height	1	32 watt Super T8 fluorescents, 3000K	Integral electronic NEMA Premium ballast	28	ea	Prudential Lighting Snap S1-1T8-04-SAL-YGW-VOLTS-SURF-**-*	1. Fixture shall be wall-mounted above closet door header.	Legion Lighting, Architectural Lighting Works, or approved equal
F9A	Closets, Storage	Identical to F9 except 2' length. Dimensions: 2' length, 2-1/4" width, 3" height	1	17 watt T8 fluorescents, 3000K	Integral electronic ballast	19	ea	Prudential Lighting Snap S1-1T8-02-SAL-YGW-VOLTS-SURF-**-*	1. Fixture shall be wall-mounted above closet door header.	Legion Lighting, Architectural Lighting Works, or approved equal
F10	Pantry 412	Surface mounted linear fluorescent under cabinet task light with solid front, lens, white painted fixture finish, and integral electronic NEMA Premium ballast. 120 volt. Dimensions: Continuous lengths as shown on drawings, 5-7/16" width, 1-9/16" height	1	32 watt Super T8 fluorescents, 3000K, per 4' length	Integral electronic NEMA Premium ballast	28	ea	Alcco Lighting Super Inch SF332 - 120 V	1. Fixture shall be mounted under cabinet so it is out of view. 2. Provide local one-gang wall switch at location to be determined. (Not shown on drawings.)	Legion Lighting, Cooper Metal, or approved equal

F15	Entry Vestibule	2" aperture surface mounted linear fluorescent slot/downlight with frosted acrylic lens, extruded aluminum housing, white painted fixture finish, white painted reflector, and integral electronic NEMA Premium ballast. Dimensions: 4' length, 2-1/4" width, 3-5/8" height	1	32 watt Super T8 fluorescent, 3000K	Integral electronic NEMA Premium ballast	28	ea	Axis Lighting Beam2 BS-F-4-T8-1-W-VOLTS-NEMA PREMIUM-1-*	1. See Common Notes 8, 9, 11 below.	Focal Point Lighting, Lite Control, or approved equal
F18	Stairs	Wall mounted linear fluorescent up/downlight with white reflector, louvers, acrylic lens for uplight, white painted fixture finish, and integral electronic NEMA Premium ballast. Dimensions: 4' length, 4" width, 4" height	2	32 watt Super T8 fluorescent, 3000K	Integral electronic NEMA Premium ballast	56	ea	Mark Lighting Duet Wall DUW-4-T8-LU-LD-VOLTS-EB-*	1. Fixture shall be mounted so that bottom of fixture is at 6'-8" AFF or higher. 2. See Common Notes 8, 9, 11 below.	Focal Point Lighting, Lite Control, or approved equal
F19	2nd Floor Lobby and Hallway	Pendant mounted linear fluorescent uplight with frosted lens, extruded aluminum housing, white painted fixture finish, cable mounting with gray cord, and integral electronic ballast. Dimensions: 2' length, 2-1/4" width, 3-5/8" height	1	17 watt (2) T8 fluorescent, 3000K	Integral electronic ballast	19	ea	Axis Lighting Beam2 Indirect BI-F-2-T8-1-W-VOLTS-E-I-CA#- *di	1. Fixture shall be mounted so that TOP of fixture aligns with ceiling fan blades. Contractor to coordinate cable/stem lengths. 2. See Common Notes 8, 9, 11 below.	Focal Point Lighting, Lite Control, or approved equal
F19A	4th Floor Lobby	Identical to F19 except 4' length with NEMA Premium ballast. Dimensions: 4' length, 2-1/4" width, 3-5/8" height	1	32 watt Super T8 fluorescent, 3000K	Integral electronic NEMA Premium ballast	28	ea	Axis Lighting Beam2 Indirect BI-F-4-T8-1-W-VOLTS-NEMA PREMIUM-1-CA#-*	1. Fixture shall be mounted so that TOP of fixture aligns with ceiling fan blades. Contractor to coordinate cable/stem lengths. 2. See Common Notes 8, 9, 11 below.	Focal Point Lighting, Lite Control, or approved equal
F19B	3rd Floor Lounge	Identical to F19A except direct pendant version with frosted lens and asymmetric reflector. Dimensions: 4' length, 2-1/4" width, 3-5/8" height	1	32 watt Super T8 fluorescent, 3000K	Integral electronic NEMA Premium ballast	28	ea	Axis Lighting Beam2 Direct BD-A-F-4-T8-1-W-VOLTS-NEMA PREMIUM-1-CA#-*	1. Fixture shall be mounted so that bottom of fixture aligns with ceiling fan blades. Contractor to coordinate cable/stem lengths. 2. See Common Notes 9, 11 below.	Focal Point Lighting, Lite Control, or approved equal
F19C	3rd Floor Lounge	Identical to F19B except 8' length. Dimensions: 8' length, 2-1/4" width, 3-5/8" height	1	32 watt Super T8 fluorescent, 3000K, per 4' length	Integral electronic NEMA Premium ballast	56	ea	Axis Lighting Beam2 Direct D-A-F-8-T8-1-W-VOLTS-NEMA PREMIUM-1-CA#-*	1. Fixture shall be mounted so that bottom of fixture aligns with ceiling fan blades. Contractor to coordinate cable/stem lengths. 2. See Common Notes 9, 11 below.	Focal Point Lighting, Lite Control, or approved equal

F20	Over Sinks	Wall bracket mounted UL Listed Wet Location downlight with white acrylic lens, white painted fixture finish, and integral electronic NEMA Premium ballast. 120 Volt. Dimensions: 4" length, 9" extension, 6" high.	1	32 watt Super T8 fluorescent, 3000K	Integral electronic NEMA Premium ballast	28	ea	Prudential P61-1T8-04-WA-TMW- D1-SC-VOLTS-WS - * - NEMA PREMIUM	1. Fixture shall be wall mounted over sink. Height 6'-0" AFF or to meet ADA. 2. See Common Notes 9, 11 below 3. Wet Location Listed.	Legion Lighting, Cooper Metal, or approved equal
F21	Storage, Electrical Room, Boiler Room	Surface mounted linear fluorescent strip light with reflector, wire guard, white painted fixture finish, and integral electronic NEMA Premium ballast. Dimensions: 4' length, 11" width, 4" height	1	32 watt Super T8 fluorescent, 3000K	Integral electronic NEMA Premium ballast	28	ea	Prudential P222-2T8-04-WG-YGW-S-SC- VOLTS-*NEMA PREMIUM	1. See Common Notes 9, 11 below.	Legion Lighting, Cooper Metal, or approved equal
F22A	Exterior Facade at Signs	Wall cantilever mounted adjustable linear fluorescent sign light with 180 degree adjustability, 12" extension arms, extruded aluminum housing, 8' or 4' lengths to minimize brackets, painted natural textured finish, clear lens, solid cut-off visor, and integral electronic NEMA Premium ballast. Fixture must be UL Listed Wet Location. Dimensions: Continuous lengths as shown on drawings, 5" height, 12" extension arms	1	32 watt Super T8 fluorescent, 3000K	Integral electronic NEMA Premium ballast, -20 degree F start.	28	ea	Insight Lighting Arida WF5-02-12"-SSD-VOLTS-TN- WYS-NEMA PREMIUM	1. Fixture shall be continuously mounted above sign for entire length of sign and so it does not block sign. Submit symmetrical layout for approval. Minimize frequency of mounting brackets. 2. See Common Notes 8, 9, 11 below. 3. Wet location listed.	Cole SL Series, Winona Lighting, Elliptipar, or approved equal
H3	Gallery	Track mounted halogen accent light with aluminum housing, WHITE painted fixture finish, self-locking yoke, on/off safety switch, and beam softener lens. Fixture shall mounted to F1/TR1, F1/TR1A, and TR2 tracks. Dimensions: 4-1/8" diameter, 4-3/8" height	1	50 watt HIR PAR20 FLOOD	n/a	n/a	n/a	LSI 270-00-WHITE	1. Contractor shall provide a quantity of (8) H3 track heads to mount to type TR1, TR1A and TR2 when halogen lighting is required. 2. See Common Notes 5, 11 below.	LiteLab, Edison Price, or approved equal
M1	Galleries	Track mounted metal halide accent light with aluminum housing, self-locking yoke, WHITE painted fixture finish, removable cross baffle, beam softener lens, UV filter, and integral electronic ballast. Dimensions: 4-1/8" aperture, 6-9/16" width, 11-1/16" height	1	20 watt ceramic metal halide PAR20 FLOOD	Integral electronic ballast	n/a	ea	LSI MHLN202-00-W-AA998-AA962	1. Fixture shall be mounted to type TR1, TR1A and TR2 track. 2. See Common Notes 5, 11 below.	See F1/ TR1 above
M2	Workshops and Pin-up Spaces	Track mounted metal halide accent light with aluminum housing, SILVER painted fixture finish, prismatic spread lens, and integral electronic ballast. Dimensions: nominal 4" aperture, 6" width, 7" height.	1	20 watt ceramic metal halide PAR20 FLOOD	Integral electronic ballast	n/a	ea	JUNO TM244-20-SL-T597	1. Fixture shall be mounted to track type TR4. 2. See Common Notes 5, 11 below.	Lightrailer, Halo, or approved equal

TR2	Entry Vestibule, 1st floor lobby, Galleries A and C	Surface mounted 1 circuit track with painted WHITE finish. 4' or 8' or 12' lengths, cut to lengths shown on drawings. Current limiters: 1Amp for 4' length, 2 Amp for 8' length, 3Amp for 12' length. Dimensions: Continuous lengths as shown on drawings, 1-13/16" width, 1-7/16" height.	n/a	n/a	n/a	30 (track allowance - exempt in galleries)	If LSI 31320-* plus current limiters.	1. Fixture types M1 and H3 shall mount to track. 2. In Gallery A track shall be surface mounted to ceiling. In Gallery C track shall surface mounted to side of beam. 3. See Common Notes 5, 6, 10, 11 below.	See F1/ TR1 above
TR4	Studios and 2nd floor Pin-up Spaces	Surface mounted 1 circuit track with current limiter and SILVER painted finish. 4' or 8' lengths as shown on drawings. Current limiters: 1A for 4' length, 2A for 8' length. Dimensions: Continuous lengths as shown on drawings, 1-3/8" width, 11-1/6" height	n/a	n/a	n/a	120 (current limiter)	JUNO T4 or T8-SL + TCL1SL or TCL2SL current limiters.	1. Supply electrical feed and all mounting components. 2. Fixture type M2 shall mount to track in pin-up space. 3. See Common Notes 5, 6, 10, 11 below.	Ligholier, Halo, or approved equal
X1	Exterior Facade	Wall surface-mounted UL Listed Wet Location ceramic metal halide wedge sconce with Eurocoat painted fixture finish and clear tempered glass. Provide quartz re-strike and battery backup when required for EM usage. Dimensions: 12-5/8" length, 12-5/8" height, 8-5/8" depth.	1	35 watt ceramic metal halide T4 lamp, 3000K	Integral electronic ballast	40	Bega 2433P-MOD 35W MH-(QUARTZ RESTRIKE)-URO	1. Fixture shall be modified for 39 watt ceramic metal halide lamping. 2. EM: If EM shown on dwgs, fixture shall have quartz re-strike with battery backup. 3. Electrical Engineer shall coordinate EM requirements and remote inverter batteries. 4. Bottom of fixture shall be 8'-10" above grade. 5. Refer to Common Notes 8, 9, 11 below.	We-ef, Ecco, or approved equal
X3	Roof doors	Wall surface mounted UL Listed Wet Location, bracket for mounting globe in vertical position, clear glass globe, screw-based socket, metal guard, natural aluminum or white painted finish as selected by Commissioner. Low Wattage label required: "20W maximum".	1	Screw-based 1200 lumen self-ballasted 20W spiral compact fluorescent, 3000K; OSI CF20EL/Mirco/830/ECO	Lamp with Integral electronic cold weather ballast	20	RAB VBR100 G - finish	1. Fixture shall be mounted so that bottom of fixture is at 6'-8" AFF or higher. 2. Integral lamp ballast shall be cold weather rated for 0 degrees F. 3. Interior wattage limit label for 20 Watts Max. 4. Owner to consider LED retrofit lamp in future when technology is suitable for enclosed fixtures. 5. If junction boxes cannot be recessed, supply RAB VXR100 G with integral J-box.	Stonco, Canlet, Abolite, or approved equal

GENERAL:

- * All luminaires and luminaire components shall be UL listed for appropriate location.
- * All fluorescent and compact fluorescent lamps shall have a CRI of 80 or greater at the correlated color temperature specified unless otherwise noted.
- * All ballasts and transformers shall have a power factor of at least 0.90 unless otherwise noted.
- * Contractor shall verify mounting details with architect and order all mounting components necessary for installation of fixture at no additional cost, even if such components are not specifically called for in the contract documents.
- * Contractor shall verify all voltages with EE before placing any orders or proceeding with any work.
- * Allowances, where given, are for the cost of the luminaire and lamps to the electrical contractor only and do not include contractor markups, wiring, trenching, labor, or any other miscellaneous expenses.
- * Beam spreads are for the beam to 10% of CBCP, given in vertical degrees by horizontal degrees.
- * All luminaires and luminaire components shall be UL listed.

- * All CFL lamps shall be of the "non-amalgam" type, to ensure fastest start and highest output at start-
- * All fluorescent and compact fluorescent lamps shall have a CRI of 80 or greater at the correlated color temperature specified unless otherwise noted.
- * All ballasts and transformers shall have a power factor of at least 0.90 unless otherwise noted.
- * Contractor shall verify mounting details with architect and order all mounting components necessary for installation of fixture at no additional cost, even if such components are not specifically called for in the contract documents.
- * Contractor shall verify all voltages with EE before placing any orders or proceeding with any work.
- * All visible conduit, junction boxes, canopy plates, hardware, ballast containers, etc. to be painted to match adjacent surfaces. Verify all colors with Architect.
- * Submit layouts for all continuous fixtures, showing lamp lengths, breaks in housing or reflectors, and mounting and power locations.
- * EE to coordinate emergency lighting requirements. Any fluorescent luminaire designated EM shall have an integral, high-output emergency battery pack.
- * All exterior luminaires shall be Marine Grade and UL listed "Suitable for Wet Location". All
- * If integral to luminaire, emergency ballast shall be factory-installed by luminaire manufacturer and not

COMMON NOTES:

1. Contractor shall provide coordinated shop drawings showing integrated work of all trades.
2. Aiming required after dark in presence of Lighting Consultant and Architect.
3. Fixture shall be ordered with necessary power supplies, drivers, power feeds and mounting hardware for installation of a complete system.
4. Locate remote transformer, drivers, and/or power supplies in a secure, concealed, accessible and well ventilated location in compliance with manufacturer's recommendations.
5. Contractor to provide all necessary lengths, feeds, connectors, supports, and other components for complete and code compliant installation.
6. Provide manufacturer's shop drawings showing all materials, finishes, run lengths (if applicable) and components for Lighting Designer and Architect review prior to fabrication.
7. Luminaire shall be ADA compliant, is not to exceed 4" extension from wall.
8. EM battery backup pack required if EM is shown on Electrical Engineer's drawings. If integral to luminaire, emergency ballast shall be factory-installed by luminaire manufacturer and not violate warranty or UL rating. See Electrical Specifications 26500 for emergency criteria. Submit technical data sheet for each unique emergency battery/ballast, at time of shop drawings.
9. Commissioner to verify mounting height A.F.F.
10. Contractor to field verify run lengths prior to ordering fixtures.
11. Commissioner to verify fixture finish.

DDC PROJECT #: PV467BRAC-R

PROJECT NAME: BRONX RIVER ART CENTER BUILDING RENOVATION

ATTACHMENT D – REVISIONS TO DRAWINGS

Drawing A300.00 East Elevation is revised as follows:

Add General Note '5. Include glazing repair for Window #48 under Base Bid if Alt. #3 is not accepted.'

Drawing A303.00 North Elevation is revised as follows:

Revise General Note '3. All windows on A303.00, storefront systems and those otherwise indicated on A530.00 to be replaced under Base Bid. References to window replacement under ALT. #3 on drawing A303.00 are deleted.'

This attachment contains the following revised drawings:

A001 DRAWING LIST AND NOTES
A203 THIRD FLOOR REFLECTED CEILING PLAN
A400 BUILDING SECTION 1
A600 INTERIOR ELEVATIONS
A605 INTERIOR ELEVATIONS
A700 FINISH SCHEDULE

S102 SECOND FLOOR FRAMING PLAN
S103 THIRD FLOOR FRAMING PLAN
S104 FOURTH FLOOR FRAMING PLAN
S201 EXTERIOR WALL ELEVATIONS
S402 SECTIONS 2

P104 THIRD FLOOR PLUMBING PLAN

M100 MECHANICAL SCHEDULES AND NOTES

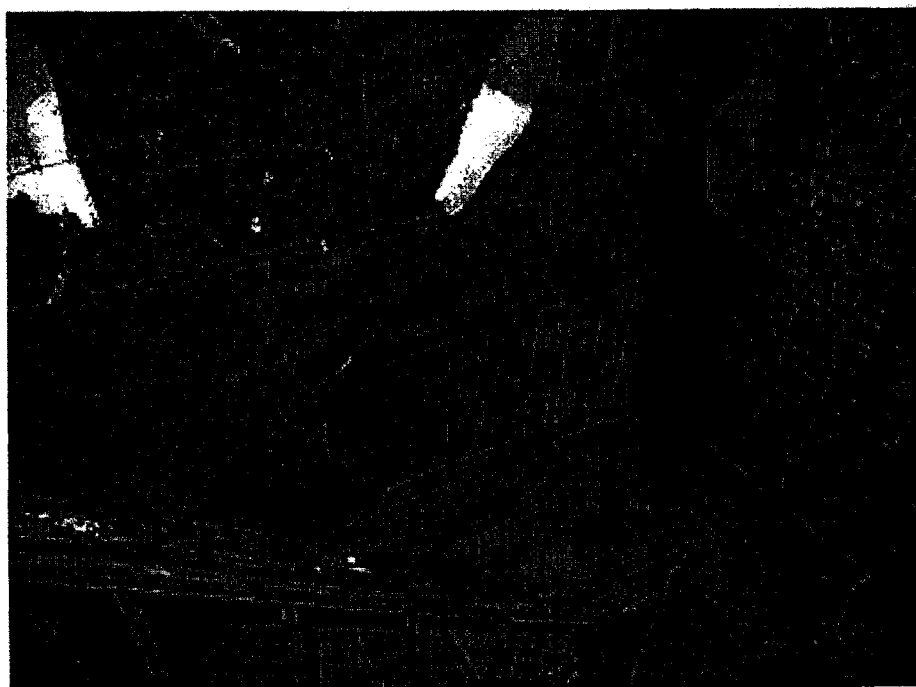
SP001 SPRINKLER NOTES, DETAILS, RISER
SP101 FIRST FLOOR SPRINKLER PLAN
SP104 FOURTH FLOOR SPRINKLER PLAN
SP105 ROOF SPRINKLER PLAN

E201 FIRST FLOOR LIGHTING PLAN
E206 LIGHTING FIXTURE SCHEDULE & DIAGRAM

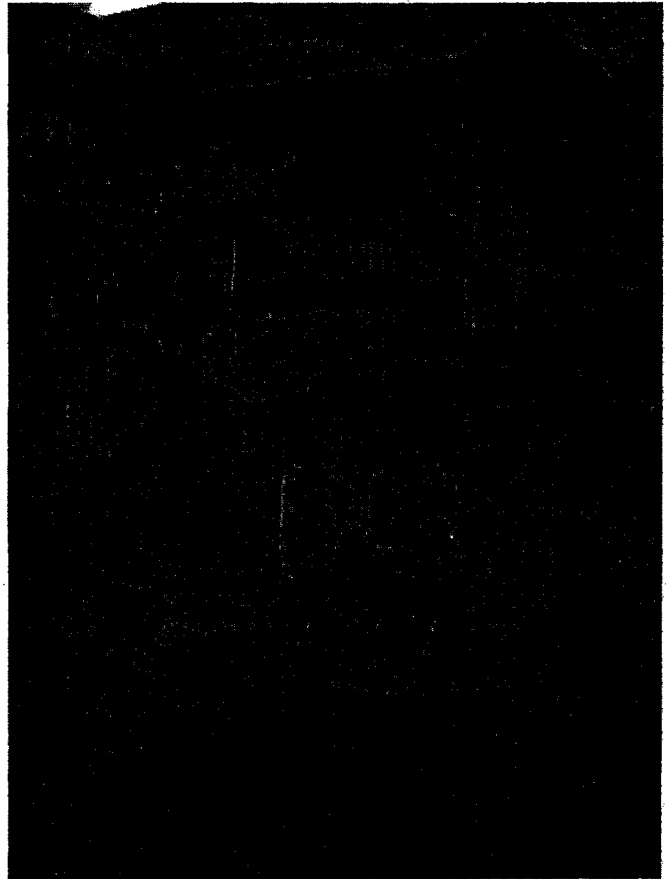
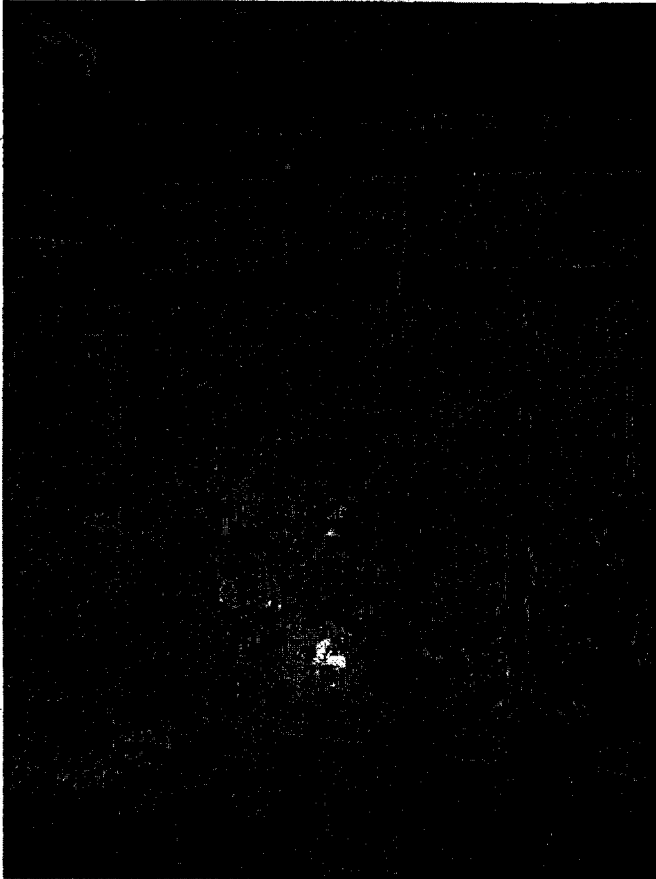
DDC PROJECT #: PV467BRAC-R

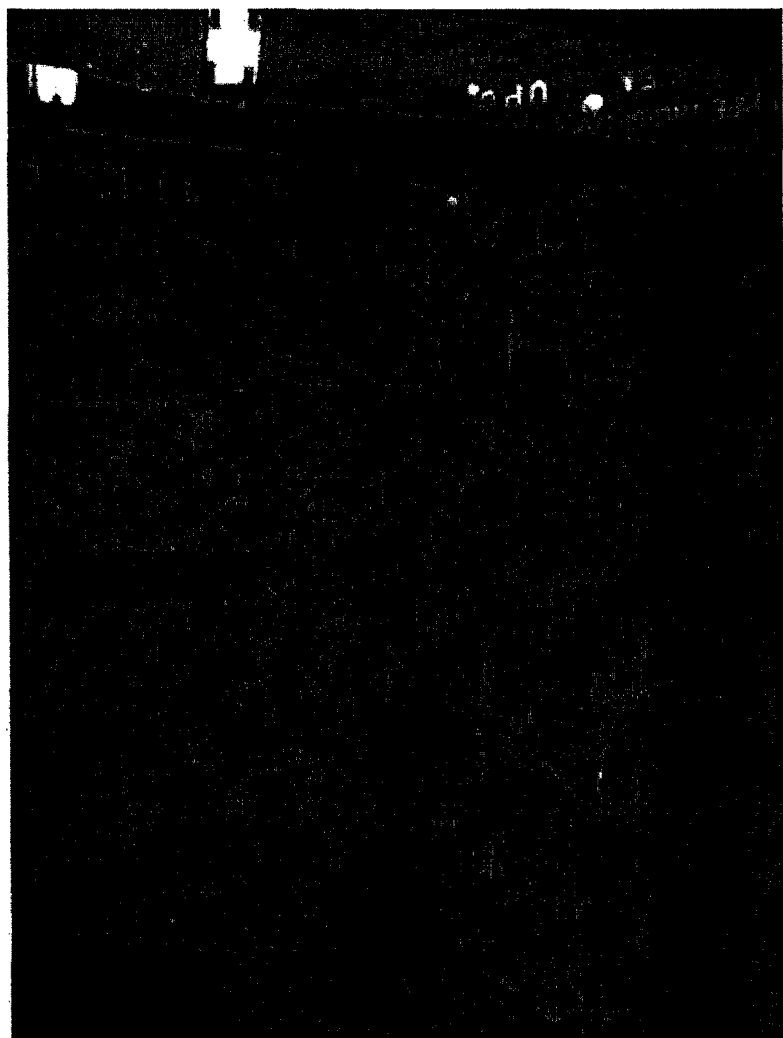
PROJECT NAME: BRONX RIVER ART CENTER BUILDING RECONSTRUCTION

ATTACHMENT E – PHOTOGRAPHS



Question #16





THE CITY OF NEW YORK
DEPARTMENT OF DESIGN AND CONSTRUCTION
DIVISION OF STRUCTURES

ADDENDUM TO THE GENERAL CONDITIONS

The General Conditions are hereby amended in accordance
with the terms and conditions set forth in this Addendum.

I. PROJECT DESCRIPTION

FMS #: **PV467-BRAC-R**

PROJECT NAME: **Bronx River Art Center, Bronx, NY**

PROJECT DESCRIPTION: This Project consists of a gut renovation of the existing Bronx River Art Center at 1087 East Tremont Avenue in the Bronx. The scope includes decommissioning the cellar, which is susceptible to flooding, stabilizing and repointing the exterior masonry walls, upgrading the building to be NYC Department of Building Code and ADA compliant, replacing all windows and interior finishes, replacing the Mechanical, Electrical, and Plumbing systems, and introducing sprinkler, fire alarm and security systems.

PROJECT LOCATION: **1087 East Tremont Avenue**
BOROUGH: **Bronx**
CITY OF NEW YORK
ZIP CODE: **10460**
COMMUNITY BOARD #: **206**
PROJECT MANAGEMENT:

- ☒ DDC shall publicly bid and enter into a single Contract for the Project. DDC shall manage the Project using its own personnel.
- ☐ DDC shall publicly bid and enter into a single Contract for the Project. A Construction Management firm (the "CM") hired by DDC shall manage the Project. The Contractor is advised that the CM shall serve as the representative of the Commissioner at the site and shall, 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 (September 2008) entitled "The Resident Engineer".
- ☐ DDC has entered into CM/Build Contract for the Project. The CM/Build Contractor shall be responsible for conducting a competitive bid process and entering into the contract for the Project.

II. CM / BUILD CONTRACT: REVISIONS TO THE GENERAL CONDITIONS

NOT USED

III. 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, 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.

This contract is subject to a Project Labor Agreement ("PLA"). In accordance with the Labor Law, 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. However, the Contract Documents for this Project (General Conditions, Drawings and Specifications) were prepared as if the requirements of the Wicks Law for separate prime contractors did apply. To correct this situation, the Contractor is advised that the Contract Documents are revised as set forth below:

- (A) Delete any and all references to separate responsibilities, separate specifications, separate drawings and/or separate contracts for the following subdivisions of the work: Plumbing Work, HVAC Work, and Electrical Work.
- (B) Revise all such references to indicate that:
 - The Project consists of a single contract, the Contract for General Construction Work.
 - All responsibilities and obligations in the Contract Documents assigned to the separate Contractors for the four subdivisions of the work are the responsibility of the Contractor for General Construction Work.

IV. SCHEDULES

The Contractor is advised that Schedules A through F 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.

V. APPLICABILITY OF ARTICLES AND AMENDED ARTICLES

The Contractor is advised that various Articles in the General Conditions may not apply to this Project or may apply as amended. Such Articles advise the Contractor to "Refer to the Addendum to the General Conditions for the applicability of this Article." Such Articles are set forth below. A check mark indicates whether the Article (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 Article, as set forth in the General Conditions, applies to the Project. Amended Articles, if any, are set forth following this list of Articles.

<u>Article No.</u>	<u>Article</u>	<u>Sub-Article or PART</u> (if applicable)	<u>Applies</u>	<u>Does not Apply</u>	<u>Applies as Amended</u>
1.04	Contract Drawings	C) PRINTS		X	
1.05	Shop Drawings and Record Drawings	B) INTEGRATED DRAWINGS	X		
1.09	Surveys		X		
1.13	Sleeves and Hangers		X		
1.15	Temporary Heat		X		
1.20	Progress Photographs		X		
1.26	Security Guards/Fire Guards on the Site		X		
1.29	Sleeve and Penetration Drawings		X		
1.30	Location of Partitions		X		
1.34	Temporary Services	PART A	X		
		PART B	X		
1.35	Temporary Use, Operation and Maintenance of Elevators during Construction	PART A – For New Buildings Up to 15 Stories		X	
		PART B – For New Buildings Over 15 Stories		X	
		PART C – Existing Buildings	X		
1.36	General Mechanical Requirements		X		
1.37	General Electrical Requirements	PART B – Section A) Temporary Lighting	X		
		PART B – Section B) Site Security Lighting (New Construction)	X		
		PART D – Electrical Conduit System Including Boxes	X		
		PART E – Electrical Wiring Devices	X		
		PART F – Electrical Conductors and Terminators	X		
		PART G – Circuit Protective Devices	X		
		PART H – Distribution Centers	X		
		PART I – Motors	X		
		PART J – Motor Control Equipment	X		

<u>Article No.</u>	<u>Article</u>	<u>Sub-Article or PART</u> (if applicable)	<u>Applies</u>	<u>Does not Apply</u>	<u>Applies as Amended</u>
1.40	Separation Between Trades			X	
1.42	Specific Requirements	C)	BORINGS		X
		E)	WORK FENCE ENCLOSURE	X	
		G)	RESIDENT ENGINEER'S OFFICE		
			1. OFFICE SPACE IN EXISTING BUILDING		X
			2. TRAILER OFFICE	X	
		H)	ADDITIONAL EQUIPMENT FOR THE RESIDENT ENGINEER	X	
		I)	PUBLIC TELEPHONE	X	
		Q)	PROJECT SIGN AND RENDERING		
			PART B – PROJECT RENDERING	X	

COMPUTER WORKSTATIONS

H) Number of Computer Workstations to be provided as outlined in Article 1.42 H, item 4: 1

VI. ADDITIONAL ARTICLES

The Contractor is advised that the additional Articles set forth below are included in the General Conditions and apply to the Project.

1.11 Permits

The Contractor is advised that the work is adjacent to property owned by the NYC Department of Parks and Recreation and will require a permit from that agency for the work proposed. It is the Contractor's responsibility to coordinate the requirements for and obtain this permit. The Contractor shall be responsible for all costs in connection with the requirements for obtaining the permit

VII. SPECIAL EXPERIENCE REQUIREMENTS FOR THE PROJECT

- (1) **GENERAL:** The following are set forth below: (a) Special Experience Requirements applicable to the contractor or subcontractor that will perform specific areas of work, and (b) Special Experience Requirements applicable to the manufacturer that will provide specific material or equipment.
- (2) **REVISION OF SPECIFICATIONS AND DRAWINGS:** In the event the Specifications and/or the Contract Drawings contain any Special Experience Requirement that is not set forth below, such Special Experience Requirement is deemed deleted, except as otherwise expressly provided in Section VIII of this Addendum.
- (3) **SPECIAL EXPERIENCE REQUIREMENTS FOR SPECIFIC AREAS OF WORK:** The special experience requirements set forth below apply to the contractor or subcontractor that will perform specific areas of work. Compliance with such experience requirements will be evaluated after an award of contract. Within two (2) weeks of such award, the contractor will be required to submit the qualifications of the contractor or subcontractor that will perform these specific areas of work. If the contractor intends to perform these specific areas of work with its own forces, it must demonstrate compliance with the special experience requirements. If the contractor intends to subcontract these specific areas of work, the proposed subcontractor(s) must demonstrate compliance with the special experience requirements. Once approved, no substitution will be permitted, unless the qualifications of the proposed replacement have been approved in writing in advance by the City.
 - (a) **Special Experience Requirement #1:** The contractor or subcontractor performing the work of this section must, within the last five (5) consecutive years prior to the bid opening, have successfully completed in a timely fashion at least three (3) projects similar in scope and type to the required work. This Special Experience Requirement applies to the contractor or subcontractor that will perform specific areas of work specified in the sections set forth below.
 - Section 075400: Thermoplastic Membrane Roofing
 - Section 085113: Aluminum Windows
 - Section 095113: Acoustic Panel Ceilings
 - Section 099646: Intumescent Fireproofing
 - Section 230900: HVAC Instrumentation and Controls
- (4) **SPECIAL EXPERIENCE REQUIREMENTS FOR MANUFACTURERS:** The special experience requirements set forth below apply to the manufacturer that will supply or fabricate specific material or equipment. Compliance with such experience requirements will be evaluated after an award of contract. Within two (2) weeks of award, the contractor will be required to submit the qualifications of the proposed manufacturer(s). Once approved, no substitution will be permitted, unless the qualifications of the proposed replacement have been approved in writing in advance by the City.
 - (a) **Special Experience Requirement #2:** The manufacturer providing the material or equipment specified in this section must, for the past five (5) years, have been regularly engaged in the manufacture of material or equipment similar in type to that required for this Project. Such similar material or equipment provided by the manufacturer must have been in satisfactory service for not less than five (5) years. Special Experience Requirement #2 applies to the manufacturer that will provide material or equipment specified in the section(s) set forth below.
 - Section 075400: Thermoplastic Membrane Roofing
 - Section 085113: Aluminum Windows
 - Section 095113: Acoustic Panel Ceilings
 - Section 099646: Intumescent Fireproofing
 - Section 230900: HVAC Instrumentation and Controls

VIII. 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 shall mean 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 Bid Booklet contains a Notice which identifies a particular product from a designated manufacturer as a "Proprietary Item", the Contractor shall be 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 Bid Booklet. Special Experience Requirements may apply to contractors, subcontractors, installers, manufacturers and/or suppliers. If the Specifications and/or the Contract Drawings contain any Special Experience Requirement that is not set forth in the Bid Booklet, 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, except as described in paragraph (b) below.
 - (b) Any Special Experience Requirement that pertains to the abatement of hazardous materials shall not be subject to the deletion and/or revision set forth above. Such Special Experience Requirement shall remain in full force and effect.
 - (c) Any Special Experience Requirement that provides that the entity 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 entity must be properly trained for the specified work.
 - (d) 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 Bid Booklet. In the event of any conflict or inconsistency between (1) the Notice regarding Alternate Bids set forth in the Bid Booklet and (2) a provision in the Specifications and/or the Contract Drawings regarding Alternate Bids, the Notice set forth in the Bid Booklet shall prevail. If the agency is not requesting the submission of Alternate Bids, as indicated by the absence of a Notice in the Bid Booklet, 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, 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, the contractor shall 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 shall prevail.
- (10) Warranties: Requirements for Warranties are set forth in Schedule B, which is included in the Addendum to the General Conditions.
- (a) 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 shall prevail.
- (b) 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 shall have no effect and the Contractor's obligation to provide the manufacturer's warranty, as set forth in the Specifications and/or the Contract Drawings, shall remain in full force and effect.
- (c) 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 shall be 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 shall 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 shall prevail.

SCHEDULE A (FOR PUBLICLY BID PROJECTS)
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 FOR GENERAL CONSTRUCTION	
Article 14 Contract	Time of Completion	Consecutive Calendar Days	540 ccds	
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 less than \$500,000	10%
			If 100% bonds are not required, and Contract Price is more than \$500,000	10%
Article 24 Contract	Maintenance & Guaranty	Percent of Contract Price	1%	
Article 77 Contract	MWBE Program	See Subcontractor Utilization Plan in the Bid Booklet		

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART I. 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
■ Commercial General Liability Art. 22.1.1	\$ 1,000,000 per occurrence \$ 2,000,000 aggregate (applicable separately to this Project) Additional Insureds: 1. City of New York, including its officials and employees, and 2. Bronx River Art Center Inc.
■ Workers' Compensation Art. 22.1.2 ■ Disability Benefits Insurance Art. 22.1.2 Employers' Liability Art. 22.1.3 <input type="checkbox"/> Jones Act Art. 22.1.4 <input type="checkbox"/> U.S. Longshoremen's and Harbor Workers Compensation Act Art. 22.1.4	Workers' Compensation: Statutory per New York State law without regard to jurisdiction Disability Benefits Insurance: Statutory per New York State law without regard to jurisdiction Employers' Liability: \$1,000,000 each accident
■ Builders' Risk Art 22.1.5 <input type="checkbox"/> Installation Floater	Applicable to Builders' Risk or Installation Floater: _____ 100 _____ % of total value of Work City of New York and the Contractor named as Loss Payee for the Work in order of precedence, as their interests may appear. <u>Note:</u> Article 22.1.5 is revised by deleting the following sentence: "Such policy shall name as insureds the City, the Contractor, and its Subcontractors". This deletion applies to Builders' Risk and Installation Floater.

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART I. 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
■ Comprehensive Business Auto Coverage Art. 22.1.6	<p>\$ <u>1,000,000</u> per accident</p> <p>If vehicles are used for transporting hazardous materials, the Contractor shall provide pollution liability broadened coverage for covered autos (endorsement CA 99 48) as well as proof of MCS 90</p> <p>Additional Insured: 1. City of New York, including its officials and employees</p>
<input type="checkbox"/> Pollution/Environmental Liability Art. 22.1.7	<p>\$ _____ per occurrence</p> <p>\$ _____ aggregate</p> <p>Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____</p>
<input type="checkbox"/> Marine Protection and Indemnity Art. 22.1.8(a)	<p>\$ _____ per occurrence</p> <p>\$ _____ aggregate</p> <p>Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____</p>

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART I. 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.

<input type="checkbox"/> Ship Repairers Legal Liability Art. 22.1.8(b)	\$_____ each occurrence [Contracting agency to fill in total value of City vessels involved]
<input type="checkbox"/> Collision Liability/Towers Liability Art. 22.1.8(c)	\$_____ per occurrence \$_____ aggregate Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____
<input type="checkbox"/> Marine Pollution Liability Art. 22.1.8(d)	\$_____ each occurrence Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____
[OTHER] Art. 22.1.9 <input type="checkbox"/> Railroad Protective Liability _____	\$_____ per occurrence \$_____ aggregate Additional Insureds: 1. City of New York, including its officials and employees, and 2. _____ 3. _____

Relating to Article 22 - Insurance

Insurance indicated by a blackened box (■) or by (X) in the ☐ to left will be required under this contract.

Addendum to the General Conditions
September 1, 2009

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART II. Broker's Certification

[Pursuant to Article 22.3.1(a) of the **Contract**, every Certificate of Insurance must be accompanied by either the following certification by the broker setting forth the following text and required information and signatures or complete copies of all policies referenced in the Certificate of Insurance. In the absence of completed policies, binders are acceptable.]

CERTIFICATION BY BROKER

The undersigned insurance broker represents to the City of New York that the attached Certificate of Insurance is accurate in all material respects, and that the described insurance is effective as of the date of this Certification.

[Name of broker (typewritten)]

[Address of broker (typewritten)]

[Signature of authorized official or broker]

[Name and title of authorized official (typewritten)]

Sworn to before me this
____ day of _____, 201__

NOTARY PUBLIC

SCHEDULE A (FOR PUBLICLY BID PROJECTS)

Relating to Article 22 - Insurance

PART III. 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 shall be sent to the address set forth below or, in the absence of such address, to the **Commissioner's** address as provided elsewhere in this **Contract**.

ACCO's Office, Insurance Unit

30-30 Thomson Avenue, 4th Floor

Long Island City, New York 11101

SCHEDULE B

Guarantees and Warranties

(Reference: Article 1.22 of the General Conditions)

GUARANTY FROM CONTRACTOR

(1) **Contractor's Guaranty Obligation:** 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 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 shall be (2) two years.
- Trees and/or Plant Material. For trees and/or plant material furnished and installed, the guarantee period shall be (2) two years. During the guarantee period, the Contractor shall 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 shall obtain a written warranty from the manufacturer. Such warranty shall 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 shall deliver all required warranties to the Commissioner.

(2) **Required Warranties:**

Specification Number	Material or Equipment	Warranty Period
072100	Building Insulation	w/ roof warranty
075400	Thermoplastic Membrane Roofing	20 years manufacturer, 2 years installer
076200	Sheet Metal Flashing	2 years
076500	Flexible Flashing	5 years
079200	Joint Sealers	2 years
081113	Hollow Metal Doors and Frames	1 year
081416	Flush Wood Doors	Life of installation

Specification Number	Material or Equipment	Warranty Period
083326	Overhead Coiling Grilles	2 years
083510	Folding Doors	3 years, 15 for finish
084113	Aluminum Entrances and Storefront	3 years, 15 for finish
085113	Aluminum Windows and Doors	10 years
087100	Finish Hardware	1 year
	Cylindrical Locksets	10 years
	Mortise Locksets	7 years
	Exit Devices	5 years
	Door Closer	10 years
	Electrified Hardware	Life of installation
088000	Glass and Glazing	W/ Aluminum Windows & Doors warranty
088400	Plastic Glazing	2 years
099200	Breathable Masonry Coating	2 years
114000	Food Service Equipment	1 year
123200	Manufactured Wood Casework	2 years
142120	Counterweighted Roped Oil Hydraulic Elevator	1 year
105113	Metal Lockers	2 years
22 14 29	Sump Pumps	Not less than 5 years
22 33 00	Electric water heaters	5 years
22 40 00	Plumbing fixtures (commercial applications)	3 years
23 21 23	Hydronic Pumps	Not less than 5 years
23 34 13	Axial fans	Not less than 5 years
23 34 16	Centrifugal fans	Not less than 5 years
23 34 23	Power ventilators	Not less than 5 years
23 51 00	Breechings, chimneys and stacks	25 years
23 51 13	Draft control devices	10 years
23 52 23	Boiler controls	2 years
23 81 46	Boiler heat exchangers	10 years
23 81 26	Split System A.C.	5 years
23 74 33	Packaged, outdoor, heating and cooling makeup air-conditioners	Not less than 5 years
23 82 39	Unit heaters	Not less than 5 years
10 05 00	Fire detection and alarm system	1 year
26 24 16	Panelboards	5 years
26 51 00	Emergency lighting unit batteries	10 years
	Emergency fluorescent ballast & self-powered exit sign batteries	7 years
26 50 10	Interior Lighting	5 years
26 56 00	Exterior Lighting	5 years
26 28 13	Fuses	1 year
26 09 23	Lighting control devices	1 year

27 51 23.50	Intercom System	1 year
28 16 00	Intrusion detection and CCTV System	1 year
28 31 11	Fire Alarm System	1 year

- (3) **Application:** The obligations under the warranty for the periods specified above shall 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 shall take precedence.
- (b) In the event a warranty requirement set forth in the Specifications is omitted from Schedule B, such omission from Schedule B shall have no effect and the Contractor's obligation to provide the manufacturer's warranty, as set forth in the Specifications, shall 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 shall be 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 shall be 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.

SCHEDULE C

Contract Drawings

(Reference: Article 1.04(A) of the General Conditions)

The Schedule set forth below lists all Contract Drawings for the Project.

ARCHITECTURAL

A000	COVER SHEET
A001	DRAWING LIST & NOTES
A002	LEGEND & ANSI DIAGRAMS
A003	TOPOGRAPHICAL & PROPERTY LINE MAP
A004	SOIL EROSION & SEDIMENT CONTROL PLAN
A005	EGRESS PLANS & RATED ASSEMBLY DIAGRAMS
A006	COMCHECK COMPLIANCE REPORTS
H001	ASBESTOS ABATEMENT GENERAL NOTES
H002	ASBESTOS ABATEMENT FIRST FLOOR PLAN
H003	ASBESTOS ABATEMENT SECOND FLOOR PLAN
H004	ASBESTOS ABATEMENT ROOF PLAN
H005	ASBESTOS ABATEMENT EAST ELEVATION
H006	ASBESTOS ABATEMENT NORTH ELEVATION
H007	ASBESTOS ABATEMENT SOUTH ELEVATION
H008	ASBESTOS ABATEMENT WEST ELEVATION
C100	UTILITIES LAYOUT PLAN & DETAILS
A020	SITE PLAN
A050	EXISTING CONDITIONS & DEMOLITION CELLAR PLAN
A051	EXIS. COND. & DEMO. FIRST FLOOR PLAN
A052	EXIS. COND. & DEMO. SECOND FLOOR PLAN
A053	EXIS. COND. & DEMO. THIRD FLOOR PLAN
A054	EXIS. COND. & DEMO. FOURTH FLOOR PLAN
A055	EXIS. COND. & DEMO. ROOF PLAN
A100	CELLAR CONSTRUCTION PLAN
A101	FIRST FLOOR CONSTRUCTION PLAN
A102	SECOND FLOOR CONSTRUCTION PLAN
A103	THIRD FLOOR CONSTRUCTION PLAN
A104	FOURTH FLOOR CONSTRUCTION PLAN
A105	ROOF CONSTRUCTION PLAN
A106	BULKHEADS CONSTRUCTION PLAN
A201	FIRST FLOOR REFLECTED CEILING PLAN
A202	SECOND FLOOR REFLECTED CEILING PLAN
A203	THIRD FLOOR REFLECTED CEILING PLAN
A204	FOURTH FLOOR REFLECTED CEILING PLAN
A205	ROOF BULKHEADS & PARAPET LIGHTING
A300	EAST ELEVATION

A301	SOUTH ELEVATION
A302	WEST ELEVATION
A303	NORTH ELEVATION
A310	DEVELOPED ELEVATION
A320	ENLARGED ELEVATION
A400	BUILDING SECTION 1
A401	BUILDING SECTION 2
A402	BUILDING SECTION 3
A403	BUILDING SECTION 4
A500	WALL SECTIONS
A501	WALL SECTIONS
A502	WALL SECTIONS
A510	STAIR B PLANS & SECTIONS
A511	STAIR C PLANS & SECTIONS
A512	STAIR DETAILS
A520	ELEVATOR PLANS & SECTIONS
A521	ELEVATOR PLAN DETAILS & CAB ELEVATIONS
A522	ELEVATOR SECTION DETAILS
A530	WINDOW SCHEDULE
A531	WINDOW DETAILS
A532	WINDOW DETAILS
A533	WINDOW DETAILS
A540	EXTERIOR SECTION DETAILS
A541	EXTERIOR SECTION DETAILS
A542	EXTERIOR SECTION DETAILS
A543	EXTERIOR SECTION DETAILS
A550	EXTERIOR PLAN DETAILS
A600	INTERIOR ELEVATIONS
A601	INTERIOR ELEVATIONS
A602	INTERIOR ELEVATIONS
A603	INTERIOR ELEVATIONS
A604	INTERIOR ELEVATIONS
A605	INTERIOR ELEVATIONS
A606	INTERIOR ELEVATIONS
A607	INTERIOR ELEVATIONS
A610	BATHROOM PLANS & ELEVATIONS
A611	BATHROOM PLANS & ELEVATIONS
A612	BATHROOM PLANS & ELEVATIONS
A613	BATHROOM PLANS & ELEVATIONS
A614	PANTRIES
A615	EGRESS PATH

A700	FINISH SCHEDULE
A701	SIGNAGE SCHEDULE
A710	PARTITION TYPES
A711	FLOOR & BASE DETAILS
A712	CEILING DETAILS
A713	CEILING DETAILS
A720	PLAN DETAILS
A721	PLAN DETAILS
A722	PLAN & SECTION DETAILS
A723	SECTION DETAILS
A724	RECEPTION DESK DETAILS
A725	BATHROOM DETAILS
A730	DOOR SCHEDULE, TYPES & DETAILS
A731	DOOR DETAILS

STRUCTURAL

S001	GENERAL NOTES
S100	CELLAR FLOOR PLAN
S101	FIRST FLOOR PLAN
S102	SECOND FLOOR FRAMING PLAN
S103	THIRD FLOOR FRAMING PLAN
S104	FOURTH FLOOR FRAMING PLAN
S105	ROOF FRAMING PLAN
S201	EXTERIOR WALL ELEVATIONS
S301	TYPICAL DETAILS 1
S302	TYPICAL DETAILS 2
S303	TYPICAL DETAILS 3
S401	SECTIONS 1
S402	SECTIONS 2

HVAC:

M100	MECHANICAL SCHEDULES
M102	FIRST FLOOR MECHANICAL PLAN
MH102	FIRST FLOOR HEATING PLAN
M103	SECOND FLOOR MECHANICAL PLAN
MH103	SECOND FLOOR HEATING PLAN
M104	THIRD FLOOR MECHANICAL PLAN
MH104	THIRD FLOOR HEATING PLAN
M105	FOURTH FLOOR MECHANICAL PLAN
MH105	FOURTH FLOOR HEATING PLAN
M106	ROOF MECHANICAL PLAN
M107	MECHANICAL DETAILS
M108	MECHANICAL DETAILS
M109	MECHANICAL DETAILS

PLUMBING:

P001	PLUMBING NOTES, SYMBOLS & DETAILS
P101	CELLAR PLUMBING PLAN
P102	FIRST FLOOR PLUMBING PLAN
P103	SECOND FLOOR PLUMBING PLAN
P104	THIRD FLOOR PLUMBING PLAN
P105	FOURTH FLOOR PLUMBING PLAN
P106	ROOF PLUMBING PLAN
P107	SITE PLAN
P500	PLUMBING RISER DIAGRAMS

SPRINKLER:

SP001	SPRINKLER RISER, DETAILS
SP101	FIRST FLOOR SPRINKLER PLAN
SP102	SECOND FLOOR SPRINKLER PLAN
SP103	THIRD FLOOR SPRINKLER PLAN
SP104	FOURTH FLOOR SPRINKLER PLAN
SP105	ROOF SPRINKLER PLAN

ELECTRICAL DEMOLITION:

DE101	BASEMENT DEMOLITION
-------	---------------------

ELECTRICAL:

E100	ELECTRICAL RISER DIAGRAM
E101	CELLAR ELECTRICAL PLAN
E102	1ST FLOOR ELECTRICAL PLAN
E103	2ND FLOOR ELECTRICAL PLAN
E104	3RD FLOOR ELECTRICAL PLAN
E105	4TH FLOOR ELECTRICAL PLAN
E106	ROOF ELECTRICAL PLAN
E107	PANELBOARD SCHEDULES NEW
E108	ELECTRICAL DETAILS & NOTES

FIRE ALARM:

FA100	FIRE ALARM RISER DIAGRAM & NOTES
FA101	1ST FLOOR FIRE ALARM PLAN
FA102	2ND FLOOR FIRE ALARM PLAN
FA103	3RD FLOOR FIRE ALARM PLAN
FA104	4TH FLOOR FIRE ALARM PLAN
FA105	ROOF FIRE ALARM PLAN

LIGHTING:

E200	CELLAR LIGHTING PLAN
E201	FIRST FLOOR LIGHTING PLAN
E202	SECOND FLOOR LIGHTING PLAN
E203	THIRD FLOOR LIGHTING PLAN
E204	FOURTH FLOOR LIGHTING PLAN
E205	ROOF LIGHTING PLAN
E206	LIGHTING FIXTURE SCHEDULE & DIAGRAM

SECURITY:

SS100	SECURITY SYSTEM DIAGRAM
SS101	1ST FLOOR SECURITY PLAN
SS102	2ND FLOOR SECURITY PLAN
SS103	3RD FLOOR SECURITY PLAN
SS104	4TH FLOOR SECURITY PLAN
SS105	ROOF SECURITY PLAN

LOW VOLTAGE:

T100	TEL-DATA RISER PLAN
T101	CELLAR TEL-DATA PLAN
T102	1ST FLOOR TEL-DATA PLAN
T103	2ND FLOOR TEL-DATA PLAN
T104	3RD FLOOR TEL-DATA PLAN
T105	4TH FLOOR TEL-DATA PLAN
T106	ROOF TEL-DATA PLAN

SCHEDULE D

Electrical Motor Control Equipment

(Reference: Article 1.37, Part K of the 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 shall 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 shall have no effect and the Contractor's obligation with respect to the electrical motor control equipment, as set forth in the Specifications, shall remain in full force and effect.

Legend for Control Type

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:
SP-1A/1B	Elevator Pit	1	1 HP	208/3	MS, HOA, AL, DB	
EF-1	1 st Floor	1	1/10 HP	115/1	TS, P	
EF-2	1 st Floor	1	1/10 HP	115/1	TS, P	
EF-3	2nd Floor	1	1/10 HP	115/1	TS, P	
FCU-A through D	1 st Floor	7	70 W (max.)	208/1	DB, T, P,	
TE-1,1A, 2, 3	1 st Floor Toilets	1	22 W	115/1	TS, P, T	
FCU-DR	2 ND Floor	1	0.9 KW	208/1	DB, T, P	

DR-1	2 ND Floor	1	1/2 HP	115/1	DB, CMS, P, T, HOA	
FCU-A through D	2 ND Floor	5	70 W (max.)	208/1	DB, T, P	
TE-4, 5	2 ND Floor Toilets	1	22 W	115/1	TS, P, T	
TE-6	3 RD Floor Toilet	1	22 W	115/1	TS, P, T	
FCU-A through C	4 TH Floor	4	45 W (max.)	208/1	DB, T, P	
CFU-A	2nd Floor 4 TH Floor	5	20 W	208/1	DB, T, P	
CFU-B	2nd Floor 4 TH Floor	1	20 W	208/1	DB, T, P	
AHU-SR	2 ND Floor	1	0.9 KW	208/3	DB, T, P	
TE-7	4 TH Floor Toilet	1	22 W	115/1	TS, P, T	
B-1	Roof	1	1/3	115/1	P, BG, T, DB	
B-2	Roof	1	1/3	115/1	P, BG, T, DB	
B-3	Roof	1	1/3	115/1	P, BG, T, DB	
P-1	Roof	1	5	208/3	CMS, P, AL HOA	
P-2	Roof	1	5	208/3	CMS, P, AL HOA	
OAI-1 (Ref Ckt)	Roof	1	5 HP	208/3	DB, P, T, F	
OAI-1 (Fan)	Roof	1	-	208/3	CMS, DB, P, T, F, HOA	(VFD - Variable Frequency Drive)

OAI-2 (Ref Ckt)	Roof	1	5 HP	208/3	DB, P, T, F	
OAI-2 (Fan)	Roof	1	-	208/3	CMS, DB, P, T, F, HOA	(VFD - Variable Frequency Drive)
CU-1	Roof	1	7 KW	208/3	DB, P, T, F	
CU-2	Roof	1	7 KW	208/3	DB, P, T, F	
CU-3	Roof	1	2.4 KW	208/1	DB, P, T, F	
CU-4	Roof	1	2.4 KW	208/1	DB, P, T, F	
CU-5	Roof	1	8.1 KW	208/3	DB, P, T, F	

CU-6	Roof	1	4.4 KW	208/3	DB, P, T, F	
CU-7	Roof	1	7 KW	208/3	DB, P, T, F	

CU-SR	Roof	1	-	208/3	DB, P, T, F	
-------	------	---	---	-------	-------------	--

EHWH-1	Sinks	8	4.5 KW	208/1	DB, T, P	
--------	-------	---	-----------	-------	----------	--

EHWH-2	1 st Floor	6	8.3 KW	208/1	DB, T, P	
--------	-----------------------	---	-----------	-------	----------	--

SCHEDULE E

NO TEXT

SCHEDULE F

Shop Drawing and Material Samples Schedule

(Reference: Article 1.41 of the General Conditions)

The Schedule set forth below lists all submittal requirements for each separate Contract. In the event of any conflict between the Specifications and this Schedule F, Schedule F shall take precedence; provided, however, in the event of an omission from Schedule F (i.e., Schedule F omits either a reference to or information concerning a submittal requirement which is set forth in the Specifications), such omission from Schedule F shall have no effect and the Contractor's submittal obligation, as set forth in the Specifications, shall remain in full force and effect.

CONSULTANT: Sage and Coombe Architects
 TELEPHONE NUMBER: 212.226.9600
 DDC PROJECT MANAGER: Stephani Resch
 TELEPHONE NUMBER: 718.391.1128

DATE: 18 June 2010

APPROVED: _____

(DDC RESIDENT ENGINEER/CPM)

REPORT DATE		FMS ID #/PROJECT ID #: PV467				CONTRACT # 1				USE SEPARATE SHEET FOR EACH TRADE									
		CONTRACT REGISTRATION #:				TRADE:				SHOP DRAWING LOG SHEET #									
		PROJECT NAME: BRONX RIVER ART CENTER																	
SPEC. SECT. #	DESCRIPTION	COORD. WITH CONTR.	SUBMITTAL			SUB. DATE	REQ'D DEL.	FABRIC. TIME	SUBMISSIONS										
			SHOP DWG.	SAMPLE	CAT. CUTS				REC'D	RET'D	ACTION	REC'D	RET'D	ACTION					
017419	Construction Waste Management & Disposal -waste management plan				✓														
018113	Sustainable Design Requirements (LEED Building) -product certificates				✓														
018119	Construction IAQ Requirements -development of Construction Indoor Air Quality Management Plan				✓														
02 41 19	Selective Demolition -proposed demo plan -noise control standards -salvage of existing items to be reused or recycled -method of controlling dust & dirt -method of protection -schedule -photographs		✓																

REPORT DATE		FMS ID #/PROJECT ID #: PV467 CONTRACT REGISTRATION #: PROJECT NAME: BRONX RIVER ART CENTER				CONTRACT # : 1 TRADE: SHOP DRAWING LOG SHEET #				USE SEPARATE SHEET FOR EACH TRADE							
SPEC. SECT. #	DESCRIPTION	COORD. WITH CONTR.	SUBMITTAL			SUB. DATE	REQ'D DEL.	FABRIC. TIME	SUBMISSIONS								
			SHOP DWG.	SAMPLE	CAT. CUTS				REC'D	RET'D	ACTION	REC'D	RET'D	ACTION	REC'D	RET'D	ACTION
028213	Asbestos Abatement		✓		✓												
03 30 00	Cast-in-place concrete -mill tests -certifications for admixtures -test reports -certifications for joint fillers, dry-shake hardeners, sealing/densifying compounds & curing compounds -product data -design mixtures -steel reinforcement shop drawings -Formwork shop drawings		✓		✓												
033300	Architectural Concrete- retaining wall at egress path		✓	✓	✓												
035216	Geofill Low Density Cellular Concrete -fill for cellar				✓												
04 20 00	Unit masonry -masonry installer's training program -product data -certificates -test reports -mock-ups		✓	✓	✓												
04 9000	Masonry Restoration and Cleaning -cleaning of existing brick walls -mock-up		✓		✓												
05 12 00	Structural steel -calculations/job standards -shop drawings -product data -welding certificates -mill test reports -source quality-control test reports		✓		✓												

REPORT DATE	FMS ID #/PROJECT ID #	CONTRACT REGISTRATION #	PV467	USE SEPARATE SHEET FOR EACH TRADE									
CONTRACT #	TRADE	SHOP DRAWING LOG SHEET #											
SPEC. SECT. #	DESCRIPTION	COORD. WITH CONTR.	SUBMITTAL			SUB. DATE	REQ'D DEL.	SUBMISSIONS					
			SHOP DWG.	SAMPLE	CAT. CUTS			REC'D	RET'D	ACTION	REC'D	RET'D	ACTION
08 71 00	Finish hardware -schedules -templates -electronic hardware systems -manuals		✓	✓	✓								
08 80 00	Glass & glazing -manufacturer's certifications -installation instructions			✓	✓								
088400	Plastic Glazing -polycarbonate for awing at roof -mock-ups			✓	✓								
08 90 00	Louvers & Vents		✓	✓	✓								
090160.9 1	Flooring Restoration		✓	✓	✓								
09 25 00	Gypsum Drywall -calculations -mock-up		✓	✓	✓								
09 31 00	Stone and Tile -certificates -maintenance guide -mock-ups			✓	✓								
09 51 13	Acoustic Panel Ceilings -certification		✓	✓	✓								
09 65 19	Resilient Tile Flooring instructions -documentation forms		✓	✓	✓								
FMS ID #/PROJECT ID # PV467 CONTRACT REGISTRATION # PROJECT NAME: BRONX RIVER ART CENTER													
09 90 00	Painting and Finishing -materials list -mock-up			✓	✓								
09 92 00	Breathable Masonry Coating -mock-up		✓	✓	✓								
10 21 13	Floor Mounted Toilet Partitions		✓	✓	✓								
10 28 00	Toilet & Utility accessories -schedule of accessories		✓		✓								
10 40 00	Signage -schedule		✓	✓	✓								

REPORT DATE		FMS ID #/PROJECT ID #: PV467 CONTRACT REGISTRATION #: PROJECT NAME: BRONX RIVER ART CENTER				CONTRACT #: 1 TRADE: SHOP DRAWING LOG SHEET #		USE SEPARATE SHEET FOR EACH TRADE									
SPEC. SECT. #	DESCRIPTION	COORD. WITH CONTR.	SUBMITTAL		SUB. DATE	REQ'D DEL.	FABRIC. TIME	SUBMISSIONS									
			SHOP DWG.	SAMPLE	CAT. CUTS			REC'D	RET'D	ACTION	REC'D	RET'D	ACTION	REC'D	RET'D	ACTION	
22 05 48	Vibration & seismic controls for plumbing piping & equipment -delegated-design submittal certificates qualification data -test reports -operation & maintenance data		✓		✓												
22 05 53	Identification for plumbing piping & equipment -schedules -valve numbering scheme			✓	✓												
22 07 00	Plumbing insulation -qualification data -test reports -field reports		✓		✓												
22 11 16	Domestic water piping -test reports			✓	✓												
22 11 19	Domestic water piping specialties -test reports -operation and maintenance data		✓		✓												
22 13 16	Sanitary waste and vent piping -inspection + test reports		✓		✓												
22 13 19	Sanitary waste piping specialties -certification -test reports -operation & maintenance manuals				✓												
22 14 13	Storm drainage piping -inspection & test reports		✓		✓												
22 14 23	Storm drainage piping specialties				✓												

REPORT DATE		FMS ID #/PROJECT ID #: PV467		CONTRACT # : 1		USE SEPARATE SHEET FOR EACH TRADE									
		CONTRACT REGISTRATION #:		TRADE:		SHOP DRAWING LOG SHEET #									
		PROJECT NAME: BRONX RIVER ART CENTER													
SPEC. SECT. #	DESCRIPTION	COORD. WITH CONTR.	SUBMITTAL		SUB. DATE	REQ'D DEL.	FABRIC. TIME	SUBMISSIONS							
			SHOP DWG.	SAMPLE	CAT. CUTS			REC'D	RET'D	ACTION	REC'D	RET'D	ACTION		
22 14 29	Sump pumps -operation & maintenance data		✓		✓										
22 33 00	Electric water heaters -certificates -test reports -operation & maintenance data		✓		✓										
22 40 00	Plumbing fixtures -operation & maintenance data -warranty		✓		✓										
22 47 00	Drinking fountains & water coolers -test reports -operation & maintenance data		✓		✓										
22 63 14	Facility natural-gas piping -delegated-design submittal certificates qualification data -operation & maintenance data		✓		✓										
21 05 00	Common work results for fire suppression -certificates				✓										
21 05 48	Vibration & seismic controls for fire- suppression piping -delegated-design submittal certificates qualification data				✓										
21 11 00	Facility fire- suppression water- service piping -reports		✓		✓										
21 13 13	Wet-pipe sprinklers systems -test reports -certificates -operation & maintenance data		✓		✓										

REPORT DATE		FMS ID #/PROJECT ID #: PV467 CONTRACT REGISTRATION #: PROJECT NAME: BRONX RIVER ART CENTER					CONTRACT #. 1 TRADE: SHOP DRAWING LOG SHEET #					USE SEPARATE SHEET FOR EACH TRADE				
SPEC. SECT. #	DESCRIPTION	COORD. WITH CONTR.	SUBMITTAL			SUB. DATE	REQ'D DEL.	FABRIC. TIME	SUBMISSIONS							
			SHOP DWG.	SAMPLE	CAT. CUTS				REC'D	RET'D	ACTION	REC'D	RET'D	ACTION		
23 05 14	Common work results for HVAC -certificates				✓											
23 05 15	Enclosed controllers -certifications -qualification data -test reports -operation and maintenance data -heater list -list of settings		✓		✓											
23 05 16	Expansion fittings and loops for HVAC piping -certificates -maintenance data				✓											
23 05 19	Meters and gages for HVAC piping -certificates		✓		✓											
23 05 23	General duty valves for HVAC piping				✓											
23 05 29	Hangers and supports for HVAC piping and equipment -certificates		✓		✓											
23 05 48	Vibration and seismic controls for HVAC piping and equipment -delegated-design submittal -certificates -qualification data -test reports		✓		✓											
23 05 53	Identification for HVAC piping and equipment -schedules valve numbering scheme				✓											
23 07 00	HVAC insulation -qualification data -test reports		✓		✓											

23 82 33	Convectors -test reports -operation & maintenance data	✓	✓																	
23 82 39	Unit heaters -certifications -test reports -operation & maintenance data	✓	✓																	

REPORT DATE		FMS ID #/PROJECT ID #: PV467		CONTRACT # 1		USE SEPARATE SHEET FOR EACH TRADE													
		CONTRACT REGISTRATION #:		TRADE:		SHOP DRAWING LOG SHEET #													
		PROJECT NAME: BRONX RIVER ART CENTER																	
SPEC. SECT. #	DESCRIPTION	COORD. WITH CONTR.	SUBMITTAL		SUB. DATE	REQ'D DEL.	FABRIC. TIME	SUBMISSIONS											
			SHOP DWG.	SAMPLE	CAT. CUTS			REC'D	RETD	ACTION	REC'D	RETD	ACTION	REC'D	RETD	ACTION	REC'D	RETD	ACTION
23 83 16	Radiant heating piping -operation & maintenance data		✓		✓														
10 05 00	Fire detection and alarm system -certificates		✓		✓														
31 23 19	Dewatering		✓		✓														
32 13 13	Concrete Walks and Curbs		✓		✓														
26 05 26	Grounding & bonding for electrical systems -test reports				✓														
26 05 33	Raceway and boxes for electrical systems -qualification data -test reports		✓		✓														
26 05 53	Identification for electrical systems -schedule			✓	✓														
26 09 23	Lighting control devices -test reports -operation & maintenance data		✓		✓														
26 24 16	Panelboards -test reports -schedules		✓		✓														
26 27 13	Electricity metering -test reports -operation & maintenance data		✓		✓														

REPORT DATE		FMS ID #/PROJECT ID #: PV467 CONTRACT REGISTRATION #: PROJECT NAME: BRONX RIVER ART CENTER				CONTRACT #: 1 TRADE: SHOP DRAWING LOG SHEET #				USE SEPARATE SHEET FOR EACH TRADE				
SPEC. SECT. #	DESCRIPTION	COORD. WITH CONTR.	SUBMITTAL			SUB. DATE	REQ'D DEL.	FABRIC. TIME	SUBMISSIONS					
			SHOP DWG.	SAMPLE	CAT. CUTS				REC'D	RET'D	ACTION	REC'D	RET'D	ACTION
26 27 26	Wiring devices -test reports -operation & maintenance data		✓	✓	✓									
26 28 13	Fuses -adjustment Information -operation & maintenance data				✓									
26 28 16	Enclosed switches and circuit breakers -test reports -service report -operation & maintenance data		✓		✓									
26 50 10	Architectural lighting -certificates -test reports -operation & maintenance data		✓		✓									
26 51 00	Interior lighting -certificates -qualification data -test reports -operation & maintenance data - warranties				✓									
27 11 00	Communication equipment room fittings -qualification data -test reports -operation & maintenance data		✓		✓									
27 15 00	Communications horizontal cabling -qualification data -test reports -operation & maintenance data		✓		✓									
27 51 23	Intercom System -qualification data -test reports -operation & maintenance data		✓		✓									

REPORT DATE		FMS ID #/PROJECT ID #: PV467 CONTRACT REGISTRATION #: PROJECT NAME: BRONX RIVER ART CENTER				CONTRACT #: 1 TRADE: SHOP DRAWING LOG SHEET #				USE SEPARATE SHEET FOR EACH TRADE							
SPEC. SECT. #	DESCRIPTION	COORD. WITH CONTR.	SPEC. SECT. #			DESCR IPTION	COORD. D. WITH CONTR.	SPEC. SECT. #	DESCRIPTION								
			SHOP DWG.	SAMPLE	CAT. CUTS				REC'D	RET'D	ACTION	REC'D	RET'D	ACTION	REC'D	RET'D	ACTION
28 16 00	Intrusion Detection & CCTV -qualification data -test reports -operation & maintenance data		✓		✓												
28 31 11	Fire Alarm -qualification data -test reports -operation & maintenance data		✓		✓												
312319	Dewatering		✓		✓												
312400	Unit Paving -mock-up		✓	✓	✓												
33 46 00	Non-Woven Geotextile and Composite Drainage Board			✓	✓												

TABLE OF CONTENTS**DIVISION 1 - GENERAL REQUIREMENTS**

017419	Construction Waste Management & Disposal
018000	Commissioning
018100	Demonstration & Training
018113	Sustainable Design Requirements (LEED Building)
018113.3	Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints & Coatings
018119	Construction IAQ Requirements
018200	Operation & Maintenance Data

DIVISION 2 -EXISTING CONDITIONS

024119	Selective Demolition
026500	Removal of Underground Storage Tanks
028013	Allowance for Incidental Asbestos Abatement
028213	Asbestos Abatement

DIVISION 3 - CONCRETE**SECTION**

033000	Cast In Place Concrete
035216	Geofill Low Density Cellular Concrete

DIVISION 4 - MASONRY**SECTION**

042000	Unit Masonry
049000	Masonry Restoration and Cleaning

DIVISION 5 - METALS**SECTION**

051200	Structural Steel
053100	Steel Deck
054000	Cold Formed Metal Framing
055000	Miscellaneous Metals
055100	Steel Pan Stair

DIVISION 6 - WOOD AND PLASTICS

SECTION

061000	Rough Carpentry
061600	Sheathing

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

SECTION

071900	Waterproofing
072100	Building Insulation
072150	Closed Cell Spray on Insulation
072400	Exterior Insulation and Finish Systems (EIFS)
072700	Vapor Barriers
075400	Thermoplastic Membrane Roofing
076200	Sheet Metal Flashing
076500	Flexible Flashing
077200	Roof Specialties and Accessories
078400	Firestops and Smoke seals
079200	Joint Sealers

DIVISION 8 - DOORS AND WINDOWS

SECTION

081113	Hollow Metal Doors and Frames
081416	Flush Wood Doors
083113	Access Doors
083326	Overhead Coiling Grilles
084113	Aluminum Entrances and Storefront
085113	Aluminum Windows and Doors
087100	Finish Hardware
088000	Glass & Glazing
088400	Plastic Glazing
089000	Louvers and Vents

DIVISION 9 - FINISHES

SECTION

090160.91	Flooring Restoration
092400	Portland Cement Plastering
092500	Gypsum Drywall
093100	Stone and Tile
095113	Acoustic Panel Ceilings
096519	Resilient Tile Flooring
099000	Painting and Finishing
099200	Breathable Masonry Coating
099646	Intumescent Fireproofing

DIVISION 10 - SPECIALTIES

SECTION

102113	Floor Mounted Toilet Partitions
102800	Toilet & Utility Accessories
104000	Signage
104416	Fire Extinguishers and Cabinets

DIVISION 11 – EQUIPMENT

DIVISION 12 – FURNISHINGS

123200	Manufactured Wood Casework
124813	Entrance Floor Mats

DIVISION 13 - SPECIAL CONSTRUCTION – (NOT USED)

DIVISION 14 - CONVEYING SYSTEMS

142120	Counterweighted Roped Oil Hydraulic Elevator
--------	--

DIVISIONS 15-20 *Not Used*

DIVISION 21 FIRE SUPPRESSION SYSTEMS

210500	Common Work Results For Fire Suppression
210548	Vibration And Seismic Controls For Fire-Suppression Piping And Equipment
211100	Facility Fire-Suppression Water Service Piping
211313	Wet-Pipe Sprinkler System

DIVISION 22 PLUMBING

220400	Basic Plumbing Requirements
220514	Common Work Results For Plumbing
220516	Expansion Fittings And Loops For Plumbing Piping
220519	Meters And Gages For Plumbing Piping
220523	General-Duty Valves For Plumbing Piping
220529	Hangers And Supports For Plumbing Piping And Equipment
220548	Vibration And Seismic Controls For Plumbing Piping And Equipment
220553	Identification For Plumbing Piping And Equipment
220700	Plumbing Insulation
221116	Domestic Water Piping

221119	Domestic Water Piping Specialties
221316	Sanitary Waste And Vent Piping
221319	Sanitary Waste Piping Specialties
221413	Storm Drainage Piping
221423	Storm Drainage Piping Specialties
221429	Sump Pumps
223300	Electric Water Heaters
224000	Plumbing Fixtures
224700	Drinking Fountains And Water Coolers
226314	Facility Natural-Gas Piping

DIVISION 23 HVAC

230513	Common Motor Requirements For HVAC Equipment
230514	Common Work Results For HVAC
230515	Enclosed Controllers
230516	Expansion Fittings And Loops For HVAC Piping
230517	Sleeves And Sleeve Seals For HVAC Piping
230519	Meters And Gages For HVAC Piping
230523	General-Duty Valves For HVAC Piping
230529	Hangers And Supports For HVAC Piping And Equipment
230548	Vibration And Seismic Controls For HVAC Piping And Equipment
230553	Identification For HVAC Piping And Equipment
230700	HVAC Insulation
230713	Duct Insulation
230719	HVAC Piping Insulation
230850	Testing, Adjusting, And Balancing
230900	HVAC Instrumentation And Control
230993	Sequence Of Operation
232113	Hydronic Piping
232123	Hydronic Pumps
233113	Metal Ducts
233300	Duct Accessories
233413	Axial Fans
233423	Power Ventilators
233713	Diffusers and Registers
234100	Air Filters
235100	Breechings, Chimneys, And Stacks
235113	Draft Control Devices
235216	Condensing Boilers
237433	Packaged, Outdoor, Heating And Cooling Makeup Air-Conditioner
238126	Split-System Air-Conditioners
238219	Fan Coil Units
238233	Convectors

DIVISION 26 - ELECTRICAL

260500	Common Work Results For Electrical
260519	Low-Voltage Electrical Power Conductors And Cables
260526	Grounding And Bonding For Electrical Systems
260533	Raceway And Boxes For Electrical Systems
260553	Identification For Electrical Systems
260923	Lighting Control Devices
262416	Panelboards
262713	Electricity Metering
262726	Wiring Devices
262813	Fuses
262816	Enclosed Switches And Circuit Breakers
265100	Interior Lighting
265113	Architectural Luminaires, Lamps and Ballasts
265600	Exterior Lighting

DIVISION 27 - COMMUNICATIONS

270500	Common Work Results For Communications
271100	Communications Equipment Room Fittings
271500	Communications Horizontal Cabling
275123.50	Educational Intercommunications and Systems

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

280500	Common Work Results For Electronic Safety And Security
280513	Conductors And Cables For Electronic Safety And Security
281600	Intrusion Detection
283111	Digital, Addressable Fire-Alarm System

DIVISIONS 29-30 *Not Used*

DIVISION 31 – EARTHWORK

312000	Earthwork
312319	Dewatering
315000	Excavation Support & Protection

DIVISION 32 – EXTERIOR IMPROVEMENTS

321400	Unit Paving
32 9343	Street Trees

DIVISION 33 – UTILITIES

334600

Non-woven Geotextile and Composite Drainage Board

APPENDIX- DOCUMENTS INCLUDED FOR REFERENCE

1. Geotechnical Investigation, Contract X288-102M, Langan Engineering & Environmental Services, 15 December 2005
2. Limited Phase II Environmental Site Investigation for Bronx River Art Center, LiRo Engineers, Inc, 24 September 2007.
3. BRAC Cellar Abandonment Memorandum, Langan Engineering & Environmental Services, 6 May 2010
4. Phase I Environmental Site Assessment for Bronx River Art Center, AKRF Environmental and Planning Consultants, 13 August 2010.

END OF SECTION

CONTRACT # 1
GENERAL CONSTRUCTION WORK

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 017419

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

- 1.1 RELATED DOCUMENTS. Contract Drawings, conditions of Contract (including General Conditions, Addendum to the General Conditions, Special Conditions, Division 01 Specification Sections and all other Contract Documents) apply to the Work of the Section.
- 1.2 REQUIREMENTS OF THIS SECTION
- A. Waste Management Goals
 - B. Waste Management Plan
 - C. Progress Reports
 - D. Project Meetings
 - E. Management Plan Implementation
- 1.3 WASTE MANAGEMENT REQUIREMENTS
- A. The City of New York has established that this project shall generate the least amount of waste possible and that processes that ensure the generation of as little waste as possible due to error, inaccurate planning, breakage, mishandling, contamination, or other factors shall be employed.
 - B. Of the inevitable waste that is generated, as many of the waste materials as economically feasible, and as stated here, shall be reused, salvaged, or recycled. Waste disposal in landfills shall be minimized.
 - C. The City of New York will seek LEED (Leadership in Energy and Environmental Design) certification for this Project at the Silver Level, 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. A minimum of 75% of total Project demolition and construction waste (by weight) shall be diverted from landfill. The following waste categories are likely candidates to be included in the diversion plan for this project:
 - 1. Land clearing debris, rock and dirt
 - 2. Concrete
 - 3. Bricks
 - 4. Concrete masonry units (CMU)
 - 5. Asphalt
 - 6. Metals (e.g. banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized, stainless steel, aluminum, copper, zinc, brass, bronze)
 - 7. Cardboard, packaging
 - 8. Reuse items indicated on the Drawings and/or elsewhere in the SpecificationOther categories are acceptable and might include:
 - 9. Clean dimensional wood
 - 10. Asphalt shingles or roofing
 - 11. Drywall
 - 12. Glass

- E. All fluorescent lamps, HID lamps and mercury-containing thermostats removed from the site shall be recycled.
- 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.

1.4 RELATED SECTIONS

- A. Section 01000 General Conditions
- B. Addendum to General Conditions
- C. Section 024119 Selective Structure Demolition
- D. Section 230513 Common Work Results for HVAC
- E. Section 220514 Common Work Results for Plumbing
- F. Section 260500 Common Work Results for Electrical

1.5 DEFINITIONS

- A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk or the like.
- B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash debris and rubble resulting from construction, remodeling repair and demolition operations. Hazardous materials are not included.
- C. Diversion from Landfill: To remove, or have removed, from the site for recycling, reuse or salvage, material that might otherwise be sent to a landfill. Diversion from Landfill does not include using the material as alternative daily cover at a landfill site, nor does it include burning, incinerating or thermally destroying waste.
- D. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product.
- E. 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.
- F. Return: To give back reusable items or unused products to vendors.
- G. Reuse: To reuse excess or discarded construction material in some manner on the Project site.
- H. Salvage: To remove a waste material from the Project site for resale or reuse.
- I. 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.
- J. 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.

1.6 REFERENCES, RESOURCES

- A. DDC encourages its contractors to seek information from websites and experts in salvage or recycling in order to minimize disposal costs. There are numerous opportunities to sell salvage, or to donate salvage and accrue tax benefits (which would accrue to the contractor); also there are outlets that will pick up, and in some cases buy recyclable materials. Examples of information resources are as follows:
 - 1. Outlets: For assistance in finding outlets for specific materials on specific projects, one possible source is New York Wa\$teMatch. Email: wastematch@itac.org
Telephone: 212-442-5219

2. DDC's Sustainable Design web site: <http://www.nyc.gov/html/ddc/html/ddcgreen> This includes a manual on Construction and Demolition Waste Reduction and Recycling, a Sample Waste Management Plan and a list of internet resources.
3. Directory of Construction and Demolition Waste Processors. A list of local recycling processors is available from New York City Department of Design and Construction, Office of Sustainable Design. DDC's consultants and contractors can request this list by contacting greeninfo@ddc.nyc.gov. This list is provided for information only and is not necessarily comprehensive; other haulers and markets are acceptable.
4. Web Resources
(Information only; no warranty or endorsement is implied.)
www.wastematch.org Site of New York Wa\$te Match, a materials exchange database and service
www.usgbc.org Site of the United States Green Building Council, with a description of the LEED certification process and requirements for C&D waste recycling
<http://www.epa.gov/epaoswer/non-hw/debris-new> Site of the U.S. Environmental Protection Agency that discusses construction and demolition waste issues, and links to other resources.

1.7 SUBMITTALS

- B. The Contractor for General Construction Work shall be responsible for the development and implementation of a Waste Management Plan for the Project. All Prime Contractors shall assist in the development of that Plan, and collect, sort and deposit their waste and recyclable materials in accordance with the approved Plan.
- C. DRAFT WASTE MANAGEMENT PLAN. Within 10 days after receipt of Notice to Proceed, or prior to any waste removal, whichever occurs sooner, the Contractor for General Construction Work shall submit to the Commissioner a Draft Waste Management Plan. The Draft Plan shall contain the following:
 1. Estimate of the total proposed jobsite waste to be generated, including types and quantities.
 2. Proposed alternatives to Landfilling: A list of each material proposed to be salvaged, reused, or recycled during the course of the Project, the proposed destination for each material, and the projected amount (by weight or CY)
- D. FINAL WASTE MANAGEMENT PLAN. Within 5 days of Commissioner's approval of the Draft Plan, the Contractor for General Construction Work shall submit a Final Waste Management Plan. It shall contain the following:
 1. Estimate of the total proposed jobsite waste to be generated, including types and quantities.
 2. Proposed alternatives to Landfilling: A list of each material proposed to be salvaged, reused, or recycled during the course of the Project, the proposed destination for each material, and the projected amount (by weight or CY)
 3. Materials handling procedures. A description of the means by which any waste materials identified in item (2) above will be protected from contamination, and a description of the means to be employed in recycling the above materials consistent with the requirements for acceptance by recycling processors to be utilized.
 4. List of documentation to be provided in Progress Reports.

1.8 PROGRESS REPORTS

- A. The Contractor for General Construction Work shall 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 jobsite waste, including:
 - A. Recycled materials. For each material, provide the following:
 - 1) Amount (in tons or cubic yards)
 - 2) Dates removed from the jobsite
 - 3) Receiving Party
 - B. Reused or salvaged materials. For each material, provide the following:
 - 1) Amount (in tons or cubic yards)
 - 2) Description of intended or actual use
 - C. Landfilled materials. Provide the following:
 - 1) Amount (in tons or cubic yards)
 - 2) Dates removed from the jobsite
 - 3) Identity of the transfer station or landfill
 3. Include legible copies of on-site logs, weight tickets and receipts. Receipts shall be from recycling and/or disposal site operators who can legally accept the materials for the purpose of reuse, recycling or disposal. If mixed construction and demolition waste is sorted off-site, provide a letter from the processor stating the average percentage of mixed C&D waste they recycle. Contractor shall save such original documents (as above) for the life of the project plus 3 year(s).

1.9 PROJECT MEETINGS

- A. Waste management plans and implementation shall be discussed at the following meetings:
1. Pre-demolition meeting
 2. Pre-construction meeting
 3. Regular job-site meetings
 4. Contractor toolbox meetings

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.1 WASTE MANAGEMENT PLAN EXECUTION

- A. The Contractor for General Construction Work shall 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 Waste Management Plan. The Contractor for General Construction Work shall oversee and document the results of the Plan. The Prime Contractors shall be responsible for collecting, sorting, and depositing in designated areas, their waste, non-returned surplus materials, and rubbish, as per the Waste Management Plan. Monies received for recycling materials shall remain with the Contractor for General Construction Work. Monies received for salvaged materials shall remain with the Contractor for General Construction

Work, except for those items specifically identified in the specifications, Division 02-Sitework, or indicated on the drawings.

- B. Distribution. The Contractor for General Construction Work shall distribute copies of the Waste Management Plan to each Prime Contractor, Subcontractor, Resident Engineer, Construction Manager, and Commissioner.
- C. Instruction. The Contractor for General Construction Work shall provide on-site instruction of appropriate separation, handling and recycling, salvage, reuse and return methods to be used by all parties in appropriate stages of the Project.
- D. Separation facilities. The Contractor for General Construction Work shall lay out a specific area(s) to facilitate separation of materials for potential recycling, salvage, reuse and return. Each potential material shall be collected and stored to avoid being mixed with other materials. Recycling and waste bin areas are to be kept neat and clean, and clearly marked.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 018000 - COMMISSIONING

PART 1 - GENERAL

1.1 RELATED DIVISIONS / SECTIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.
- B. 018100 Commissioning: Demonstration & Training.
- C. 018200 Commissioning: Operation & Maintenance (O&M) Data.

1.2 RELATED DOCUMENTS

- 1. ASHRAE Guideline 1-1996 "The HVAC Commissioning Process".
- 2. ASHRAE Guideline 0-2005 "The Commissioning Process".

1.3 SUMMARY

A. Background/Purpose

- 1. A Commissioning Agent (CxA – DomeTech Commissioning Services) has been contracted to provide Building system commissioning services for this project.
- 2. The intent of this specification is to:
 - 1. Familiarize the contractor with the commissioning process and denote the differences from a "non-commissioned" project.
 - 2. Specify what labor/tasks are required by the contractor (and subcontractors) to support the commissioning effort so that the contractor (and subcontractors) can properly estimate the costs for this work.

B. Goals of the Cx (Commissioning) Process

- 1. Verify that equipment and systems are installed/constructed as per the contract documents.
- 2. Ensure that equipment and systems operate as described in the design intent and contract documents.
- 3. Verify contract conformance of equipment and systems.
- 4. Verify that O&M manuals and associated documentation are complete and detailed as per contract documents.
- 5. Verify that the Owner's operations/maintenance personnel are adequately trained as per contract documents.

1.4 DEFINITIONS

A. Building Systems Commissioning:

1. Commissioning is the process that ensures building systems are designed, installed, functionally tested, and capable of being operated and maintained in conformance with the design intent (owner's requirements). Commissioning for this project follows requirements outlined in section 1.2 RELATED DOCUMENTS. This approach will be applied to all commissioned systems.

B. Installation Check:

1. A comprehensive check sheet to verify that the equipment has been correctly installed as per the contract documents.

C. Functional Check:

1. An individual system component check. These checks verify that components operate correctly in a standalone type situation, meet the required performance criteria, and operate as per contract documents. Integrated system tests follow individual functional tests and ensure that all integrated elements operate together, in the installed condition, as per design intent and functional requirements.

D. Performance Test:

1. Performance tests verify stated manufacturer's flows, pressures and other standardized parameters.

E. Commissioning Plan:

1. A document defining the Cx process and scope as the project progresses through its various phases.

F. Issue

1. Any defects, problems, and deficiencies that do not meet contract requirements or the intent of the project design. All Issues are entered into a database by the Commissioning Consultant to enable tracking and closeout:

G. Abbreviations----The following are common abbreviations used in this section:

A/E	Architect/Engineer	IC	Installation Check
AHU	Air Handling Unit	O&M	Operation & Maintenance
CM	Construction Manager	PT	Performance Test
CxA	Commissioning Agent	SOP	Sequence of Operation
Cx	Commissioning	Subs	Subcontractors (to the Contractor)
FC	Functional Check	TAB	Test, Adjust, Balance
HVAC	Heating, Ventilation, Air- Conditioning	VAV	Variable Air Volume Unit

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.1 SCHEDULING

- A. All critical commissioning activities will be incorporated into the Project Schedule.

3.2 COORDINATION

- A. The CxA reports directly to the Client. Coordination of performance and acceptance tests will be by the Contractor.
- B. A Commissioning Plan document will be issued that defines all commissioning tasks and responsibilities for the project.

3.3 CONTRACTOR RESPONSIBILITIES

A. Meetings

1. Cx Scope Meeting

- 1. The CM, the Contractor and sub-contractors (mechanical, electrical, controls and TAB) will attend a Cx scope meeting at the start of the project. The meeting will include a presentation on the Cx process, an introduction of Cx project personnel, and a review of responsibilities and requirements of the contractors and subcontractors.

2. Periodic Cx Meetings

- 1. During the construction and start-up phases of the building systems, the CxA (Dome-Tech Commissioning Services) will hold commissioning status meetings. The contractor and only those sub-contractors associated with the current work will be required to attend.
- 2. The frequency of the meetings is at the discretion of the CxA. The meetings will normally last less than 1 hour, but can be longer if there are numerous topics/Issues to discuss.

B. Submittals

- 1. In addition to the normal submittal schedule the Contractor will provide a submittal schedule and an additional copy of the following submittals for the CxA.

- 1. Commissioned systems product data sheets, start-up manuals, and O&M manuals.
- 2. Commissioned systems shop drawings.
- 3. Automatic Temperature Controls equipment submittals: sensors, actuators, control hardware.
- 4. Automatic Temperature Controls related drawings (Piping & Instrumentation Diagrams, loop sheets, etc.) and written SOP's.
- 5. Automatic Temperature Controls point list
- 6. TAB (Test Adjust Balance) plan.
- 7. Equipment vendor start-up check sheets, procedures.

2. Submittal Review by the CxA

1. The CxA will review approved submittals and provide comments to the A/E. The A/E has the authority to accept or reject these comments.
2. The Cx review of the submittals will center on operations, maintenance, and the equipment/system's ability to be properly commissioned (commissionability) by the CxA.

C. Commissioning Check Sheets

1. The primary task of the Contractor (and subcontractors) will be to complete commissioning check sheets as provided by the CxA, which are specific to the equipment and systems of the project. There are two types of check sheets: Installation Checks (IC's) and Functional Checks (FC's).
2. Check sheets will be generated by the CxA for each major piece of commissioned equipment.
3. The check sheets contain simple yes/no questions that are to be filled out by the subcontractors, tradesman, foreman or vendor start-up engineers. Samples of these check sheets are included as an Appendix to this section.
4. The CxA will review all check sheets so that the subcontractors fully understand each check sheet. If requested, the CxA will complete an initial check sheet together with the tradesman/subcontractor.
5. A binder containing all blank check sheets will be furnished to the Contractor prior to the commencement of MEP (or other commissioned equipment) installation work. The check sheets shall be completed, and placed in a separate "Completed Check sheet" binder. The CxA will collate the completed check sheets and file them into the commissioning manual. Installation Check sheet shall be completed during component installation. Installation check sheets shall be complete prior to the performance of the Functional test and Check sheet completion.
6. The CxA will review all check sheets for completeness and accuracy. All "NO" answers will be examined, and entered as an "ISSUE" within the Cx database.
7. The CxA will randomly field check a percentage of the check sheets completed (percentage is specified in the Cx Plan). This will verify that the sheets were properly filled out. If it is determined that they were not, the CxA will direct the contractor to repeat the checks and redo the check sheets. The CxA will not field verify a Check sheet until it is completed in its entirety.
8. The Contractor will complete check sheets as the work progresses, not after the project is complete. This will be done so that any Issues are detected early and not repeated on multiple pieces of equipment.
9. FC check sheets on equipment cannot be initiated until relevant IC check sheets have been completed.
10. FC's are to be executed and completed by the Contractor. The CxA will be given five (5) business days advance notification on FC execution for all equipment.
11. Examples of the type and number of questions that are the Contractor's responsibility in a typical Installation Check (IC) sheet for an Air Handling Unit are shown below (each item is to be confirmed, initialed and dated by the installer---selected pieces of equipment will be checked by the Commissioning Consultant to assure accuracy):
 - Have the outside air dampers and actuators been installed?

- Has the outside air damper actuator wiring been landed at the AHU controller terminal?
- Has the cooling coil control valve actuator wiring been landed at the AHU controller terminal?
- Has the freeze stat been installed?
- Has the freeze stat output wiring been landed at the AHU controller terminal?
- Has the supply air temperature sensor been installed?
- Has the supply air temperature sensor output wiring been landed at the AHU controller terminal?
- Has the supply fan smoke detector been installed?
- Has the supply fan smoke detector output wiring been landed at the AHU controller terminal?
- Has the supply filter differential pressure sensor been installed?
- Has the supply filter differential pressure sensor wiring been landed at the AHU controller terminal?
- Has the supply fan start/stop relay wiring been landed at the AHU controller terminal?
- Has the supply fan status current transformer been installed?
- Has the supply fan status current transformer wiring been landed at the AHU controller terminal?

Two sample IC sheets are included for the bidders' information at the end of this section. The first is a check sheet for an AHU, to be completed by the Controls contractor. The second is a check sheet for an AHU, to be completed by the Electrical Contractor.

12. Examples of the type and number of questions that are the Contractor's responsibility in a typical Functional Check (FC) sheet for an AHU are shown below (each item is to be confirmed, initialed and dated by the installer---selected pieces of equipment will be checked by the Commissioning Consultant to assure accuracy):
- Does the BMS accurately represent the AHU and properly display its operational status?
 - Measure and check the following sensor readings "as-found" (All sensors should be checked with calibrated NIST traceable test equipment):
 - OA Temperature
 - OA Relative Humidity
 - Inlet and Outlet Fan Pressure
 - Return Air Temperature
 - Supply Air Relative Humidity
 - Verify the stroking of the following dampers (fan off)
 - Do the supply dampers open completely?
 - Do the supply dampers close completely?
 - Did damper interlocks operate properly?
 - Verify the stroking of the following hydronic valves (fan off)
 - Does the heating valve open completely?
 - Does the heating valve close completely?
 - Does the cooling valve open completely?
 - Does the cooling valve close completely?

- Component verification – visually inspect unit prior to operation
 - Set freeze stat to trip & verify operation. Did the fan shut down?
- Did the BMS alarm?
 - Set filter DP switch to trip & verify operation. Did the BMS alarm?

A sample functional check sheet is included for the bidders' information at the end of this section. The check sheet is for an AHU, to be completed by the Controls contractor.

D. Correction of Issues

1. During the course of project construction and start-up, issues will be identified and logged by the CxA. "Issue" sheets will be forwarded to the CM and A/E for review. After this occurs, the issue sheets will then be forwarded to the Contractor for response and resolution.
2. When the Contractor receives an issue, the Contractor must either correct the issue or explain it. All issue sheets must be filled out and returned to the CxA within 5 business days by the Contractor.
3. The CxA will track all issues. The commissioning meeting agenda will include a review of open and disputed issues.

E. TAB Contractor Specific Requirements

1. The TAB contractor will furnish a detailed balancing plan document for review and approval by the CxA and A/E. At a minimum, the document must be furnished six weeks prior to planned TAB activities.
2. The TAB contractor will be required to provide NIST traceable calibration sheets for all equipment used for TAB work.
3. The TAB contractor will be required to fill out FC's (developed by the CxA) to supplement his/her own data sheets. These check sheets must be furnished along with the final balancing report.
4. The CxC will conduct field visits during the balancing activities to verify the balancing plan is being properly followed and applied. If the TAB contractor is not following correct balancing procedures (TAB plan, AABC, NEBB), the CxA has the right to temporarily stop TAB work.
5. Upon completion of balancing activities and issuance of the balancing report, the CxA, along with the A/E, will review the report. After this review, the CxA will randomly verify a percentage of the readings utilizing calibrated test equipment. This percentage will be called out in the Commissioning Plan. If readings are determined to be outside of the balancing criteria, then each reading will be entered as an Issue. The TAB contractor must either correct or explain the Issue.

F. Automatic Temperature Controls Contractor Specific Requirements

1. The Automatic Temperature controls' contractor will provide a detailed submittal package including controls drawings, schematics and written sequences of operation for the CxA.

2. The Automatic Temperature controls' contractor will be required to fill out IC's and FC's developed by the CxA. The CxA will verify a random sample percentage of these completed worksheets (established in the commissioning plan). The Automatic Temperature controls' contractor will supply personnel necessary to assist in performing this work.
3. The Automatic Temperature controls' contractor may be required to set up data logs/trending for the CxA to verify proper system controls (If trending capability exists).
4. A random sample of instrumentation (temperature, humidity, pressure, and flow sensors) will be checked for proper calibration.
5. The Automatic Temperature controls' contractor will be required to demonstrate and verify that the system performs as per the contract documents.

G. Performance Testing (PT)

1. At the completion of the FC's, the CxA will conduct PT's as described in the commissioning plan. The PT's verify the compliance with contract requirements established at the beginning of the project, as well as the performance of major equipment.
2. Issues identified during the PT's will be resolved by the installation contractor and determine the cause. If it is non-other than a design Issue, the Contractor must correct the Issue at his/her cost.
3. The respective subcontractors will be required to assist the CxA with all PT's. This will include but may not be limited to the operation of equipment during the PT's.

H. Retesting by the Commissioning Consultant (CxA)

1. One CxA retest will be allowed per like component (Note: VAV boxes, unit ventilators, and fan coil units etc., will not be considered as separate components. For example, if there is an issue with several VAVs, only one retest will be provided for a VAV at no cost), Additional tests will be charged to the installing contractor responsible for the problem.
2. The costs for additional retesting will be absorbed by the contractor and will be billed on a Time & Material basis at the rates established in the CxA master contract. The CxA may waive this requirement at their discretion for special circumstances.
3. The CxA will not perform any additional retests unless the responsible contractor has formally approved the costs for retests.

I. Operations and Maintenance Data Requirements

1. The CxA will verify all O&M data requirements as specified within the project specifications.
2. The CxA will outline additional O&M data requirements in Section 018200 (Commissioning – Operations and Maintenance Data). These additional O&M data requirements as set forth by the CxA will not replace O&M data documentation requirements as outlined in the project specifications. Section 018200 is additional O&M data documentation requirements required to be performed in addition to the requirements specified in the project specifications. In general, the CxA O&M data requirements are more stringent than what is typically encountered. Close attention should be paid to these requirements.

J. Project Training Requirements

1. The CxA will verify all project training requirements as specified within the project specifications.
2. The CxA will outline additional training requirements in Section 018100 (Commissioning – Demonstration and Training). These additional training requirements as set forth by the CxA will not replace training requirements as outlined in the project specifications. Section 018100 consists of additional training requirements that are required to be performed in addition to the requirements specified in the project specifications. In general, the CxA O&M data requirements are more stringent than what is typically encountered. Close attention should be paid to these requirements.

3.4 CERTIFICATE OF SYSTEM ACCEPTANCE


- A. Upon completion of system performance testing and the submission of all project documentation and training portions of the project, a Certificate of Acceptance letter will be provided by the CxA to the Contractor. This letter will list any open Issues associated with the commissioning. Progress payments will be made relative to this letter.


3.5 EQUIPMENT/SYSTEMS TO BE COMMISSIONED

- A. The following types of equipment and their associated systems included in the contract documents identify (but do not limit) items to be commissioned.
1. HVAC Systems
 2. HVAC components
 3. ATC/BMS Systems
 4. Domestic Water
 5. Emergency Generator/ATS
 6. Emergency Power Systems
 7. Lighting Control
 8. Electrical distribution
 9. Life Safety tied into HVAC/ATC/BMS Systems
- B. A detailed equipment list is found in the Commissioning Plan – Appendix 2.

END OF SECTION 018000

Appendix 1: Sample Check Sheets


		INSTALLATION CHECK SHEET		Page 1 of 2	
<i>Air Handling Unit</i>					
PROJECT: <i>Sample sheet</i>	COMPONENT REVIEWED:	Air Handling Unit			
LOCATION: <i>Mechanical Room</i>	TAG: AHU	DISCIPLINE: Controls			
<i>Ensure that all safety procedures are followed while completing this form.</i>		CIRCLE THE APPROPRIATE RESPONSE		INITIAL	DATE
1. Have the outside air dampers and actuators been installed?		Y	N		
2. Has the outside air damper actuator wiring been landed at the AHU controller terminal?		Y	N		
3. Has the cooling coil control valve actuator wiring been landed at the AHU controller terminal?		Y	N		
4. Has the freeze stat been installed?		Y	N		
5. Has the freeze stat output wiring been landed at the AHU controller terminal?		Y	N		
6. Has the supply air temperature sensor been installed?		Y	N		
7. Has the supply fan smoke detector been installed?		Y	N		
8. Has the supply fan smoke detector output wiring been landed at the AHU controller terminal?		Y	N		
9. Has the supply filter differential pressure sensor been installed?		Y	N		
10. Has the supply fan start/stop relay wiring been landed at the AHU controller terminal?		Y	N		
11. Has the supply fan status current transformer been installed?		Y	N		
FORM COMPLETED BY:					
PRINT NAME & COMPANY:				INITIAL & DATE:	


	INSTALLATION CHECK SHEET	Page 2 of 2
<i>Air Handling Unit</i>		

This space will include a reference controls wiring diagram for the AHU for the contractor and the verifying commissioning consultant

Comments

FORM COMPLETED BY:	
PRINT NAME & COMPANY:	INITIAL & DATE:

		INSTALLATION CHECK SHEET		Page 1 of 2	
<i>Air Handling Unit</i>					
PROJECT: <i>SAMPLE SHEET</i>		COMPONENT REVIEWED: Air Handling Unit			
LOCATION: <i>MECHANICAL ROOM</i>		TAG: AHU	DISCIPLINE: Electrical		
<i>Ensure that all safety procedures are followed while completing this form.</i>		CIRCLE THE APPROPRIATE RESPONSE		INITIAL	DATE
1. Have the supply fan starter overload relay been properly set to the full load amp (FLA) rating of the motor?		Y	N		
2. Does the supply fan starter have an HOA switch?		Y	N		
3. Is the supply fan starter fitted with a color running light to indicate motor/pump operation?		Y	N		
4. Does the supply fan installation have a disconnect switch?		Y	N		
5. Is the supply fan starter fed from MCC <i>XX-XX (XXX Volts, X phase)?</i>		Y	N		
6. Has the main power wiring from MCC <i>XX-XX</i> been landed at the starter and supply fan?		Y	N		
FORM COMPLETED BY:					
PRINT NAME & COMPANY:					INITIAL & DATE:

	INSTALLATION CHECK SHEET	Page 2 of 2
<i>Air Handling Unit</i>		

This space will include a reference electrical wiring diagram for the AHU for the contractor and the verifying commissioning consultant

FORM COMPLETED BY:	
PRINT NAME & COMPANY:	INITIAL &
	DATE:

	FUNCTIONAL CHECK SHEET	Page 1 of 1
---	-------------------------------	--------------------

<i>Air Handling Unit</i>									
PROJECT:		COMPONENT:		Air Handling Unit					
LOCATION:		TAG:		DISCIPLINE:					
<i>Mechanical Room</i>		AHU		Controls					
Ensure that all safety procedures are followed while completing this form.					CIRCLE THE APPROPRIATE RESPONSE		INITIAL	DATE	ISSUE REF. #
1. Does the BMS accurately represent the AHU and properly display its operational status?					Y	N			
2. Measure and check the following sensor readings "as-found" (All sensors should be checked with calibrated NIST traceable test equipment):									
Sensor	Measured Value (NIST traceable instrumentation)	BMS Value	Difference Between Measured and BMS Value	Allowable Tolerances Temp. $\pm 1^{\circ}\text{F}$, RH $\pm 5\%$, Pressure $\pm 0.25''\text{WC}$					
a. Return Air Temp. ($^{\circ}\text{F}$)				Y	N				
b. Supply Air Relative Humidity (%)				Y	N				
3. Verify the stroking of the following dampers (fan off)									
a. Do the supply dampers open completely?					Y	N			
b. Do the supply dampers close completely?					Y	N			
c. Did damper interlocks operate properly?					Y	N			
4. Verify the stroking of the following hydronic valves (fan off)									
a. Does the heating valve open completely?					Y	N			
b. Does the heating valve close completely?					Y	N			
c. Does the cooling valve open completely?					Y	N			
d. Does the cooling valve close completely?					Y	N			
5. Component verification – visually inspect unit prior to operation									
a. Set freeze stat to trip & verify operation. Did the fan shut down?					Y	N			
i. Did the BMS alarm?					Y	N			
b. Set filter DP switch to trip & verify operation. Did the BMS alarm?					Y	N			

THIS PAGE LEFT INTENTIONALLY BLANK

SECTION 018100 - DEMONSTRATION & TRAINING

PART 1. GENERAL

1.1. RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.
- B. Reserved.

1.2. SUMMARY

- A. This Section includes administrative and procedural requirements for providing site specific instruction to Owner's personnel, including the following:
 - 1. Instruction for the following groups of personnel.
 - a. Building Occupants
 - b. Operations & Maintenance Staff
 - c. Staff HVAC Technicians
 - 2. Demonstration of equipment operation and maintenance based on the manuals prepared under Section 018200 - Operation & Maintenance Data.
 - 3. Preparation and delivery of training materials in electronic format (i.e. MS Power Point, MS Word, PDF, etc.).

1.3. RELATED SPECIFICATION SECTIONS

- A. Section 018200 - Operation & Maintenance Data.

1.4. DEFINITIONS

- A. Qualified Instructor – person or persons knowledgeable in the education of technical personnel.
- B. Training Module – a period of instruction with a specific objective and subject matter.
- C. Training Plan – a written document prepared by the Contractor (or designated representative) defining training module curriculum, instructors, and proposed training schedule and locations.
- D. Training Materials – a package of materials to support the instruction of personnel, including written course materials, tests, video and computer based presentations.

1.5. SUBMITTALS

- A. Preliminary Submittal
 - 1. Training Plan Outline and Format
 - 2. Planned Training Materials

3. Training Schedule Format with Tentative Dates
 4. Attendance Record Sheet
- B. Pre-Training Submittal
1. Final Training Plan
 2. Approved Training Schedule
 3. Sample Training Materials
- C. Training Close-Out Submittal
1. Training Materials
 2. Completed Attendance Record Sheets
 3. Completed Test Sheets

1.6. ROLES & RESPONSIBILITIES

- A. Owner – shall provide review comments on preliminary submittals, coordinate training schedule with the Contractor, provide their staff for training.
- B. Architect/Engineer (A/E) – shall provide review of preliminary and pre-training submittals.
- C. Contractor – shall coordinate the development and planning of the project's training program. The Contractor is ultimately responsible for the execution of this section and covering any gaps not addressed by any subcontractors.
- D. Installation Contractor – for systems and equipment under their scope of work, the installer is responsible for development and execution of training and coordination of manufacturer support.
1. Instructors Qualifications
- a. The instructor shall have received specific training from the manufacturer regarding the inspection, testing and maintenance of the system required. The instructor shall train in the care, adjustment, maintenance and operation of the new facility in operating theory as well as practical operation and maintenance work.
- E. Commissioning Agent (CxA) – Responsible for facilitating the entire owner training process. The CxA reviews agendas and materials developed by the contractor in advance of the trainings for quality completeness and accuracy. The CxA shall also attend a number of the key training sessions to evaluate effectiveness and suggest improvements in the delivery of the material
- F. Manufacturer – when vendor or manufacturer has a prepared instruction service or presentation, it may be used to supplement provided training.
- G. Trainees – will prepare for training sessions by reviewing material provided prior to the session, and attend their scheduled training as listed in the Approved Training Schedule.

1.7. SYSTEMS & EQUIPMENT COVERED

- A. HVAC Systems
1. Heating Equipment

2. Cooling Equipment
 3. Air Distribution
 4. Ventilation Equipment
 5. ATC/BMS Controls
- B. Plumbing Systems
1. Domestic Water System
 2. Domestic Hot Water System
 3. Plumbing Fixtures
 4. Sanitary Drain System
 5. Storm Drain System
 6. Rainwater Harvesting System
- C. Electrical Systems
1. Main Electrical Service
 2. Electrical Distribution Equipment
 3. Grounding System and Lightning Protection
 4. Lighting Equipment
 5. Lighting Controls
 6. Emergency/Stand By Power Systems
 7. Emergency/Stand By Power Distribution Equipment
 8. Uninterruptible Power Supply (UPS) Systems

1.8. TRAINING MODULES

- A. Facility Occupant Module
1. Provide an overview of the facility and its systems with the goal of educating the future occupants of the facility on its features and controls.
 2. Demonstrate adjustments users can make, and what impact the adjustments will have on the facility.
 3. Instruct users on how to report problems and request service from the Operations & Maintenance Staff.
 4. Prepare a quick reference card to distribute to trainees, highlighting the items covered in this module.
- B. System Training
1. For each system prepare two curriculums; the first for general maintenance workers, and the second for specific shop workers who will be operating and maintaining the equipment.
 2. For the General Maintenance track of training the following topics will be covered:
 - a. Basis of Design, Operational Requirements
 - b. System Documentation
 - i. Manufacturer's Manuals

- ii. As Built Drawings
 - iii. Site Specific Manuals
 - c. Emergency Operations
 - d. Normal Operations
 - e. Identification and Reporting of Problems
3. For the Specific Shop track of training the following additional topics will be addressed.
- a. System Adjustments
 - b. Troubleshooting
 - c. Maintenance
 - d. Repairs
4. System Training will consist of classroom training, followed by hands on demonstration in the facility on the equipment being covered.

PART 2. PRODUCTS

2.1. TRAINING MATERIAL FORMAT

- A. Text Training Materials – shall be prepared in a format that is 100% MS Word compatible. Manufacturer prepared materials may be submitted in Adobe PDF.
- B. Graphics – shall be prepared in AutoCAD or Visio compatible format.
- C. Photographs – shall be submitted in JPEG format, with minimum sensor size of 1.3 mega pixels.
- D. Printed Study Documents – shall be 8½”X11” for text documents, and 11”X17” for drawings and sketches.
- E. Computer Based Projected Presentations – shall be prepared using MS Power Point compatible program.

2.2. TRAINING MATERIAL PACKAGING

- A. Training Close-Out Submittal shall have printed materials bound and media in an approved storage case.
- B. Binders:
 - 1. Sizes up to 1”
 - a. Slant Ring Type
 - 2. Sizes up to 3”
 - a. Swing Hinge Type
 - b. Telescoping Post Type

C. Electronic/Computer Files:

1. CD-ROM (Preferred)

- a. Provide copies of all electronic files used in the execution of this training program in their native format and in a MS compatible format on a Recordable CD-ROM disc.
- b. Write files to CD-ROM disk using ISO 9660 specifications.
- c. CD-ROMs shall have a printed label with the following information:
 - i. Name of Project.
 - ii. Name of Preparer
 - iii. Name of General Contractor
 - iv. Date CD-ROM was produced.
 - v. Description of disc contents
- d. If the CD-ROM is not readable by the Owner's computer equipment, a new CD-ROM must be submitted at no additional cost to the Owner.

2. Deliver CD-ROM Media in vinyl pockets suitable for storage in a standard Three-Ring Binder.

PART 3. EXECUTION

3.1. PREPARATION

A. Preliminary Submittal

1. Within one hundred and eighty (180) days of Notice to Proceed (NTP) submit the preliminary submittal consisting of the following:
 - a. Training Plan Outline
 - b. Planned Training Materials
 - c. Training Schedule Format with Tentative Dates
 - d. Attendance Record Sheet

B. Pre-Training Submittal

1. Forty-five (45) Days prior to first scheduled training session submit the Pre-Training Submittal consisting of the following:
 - a. Final Training Plan
 - b. Sample Training Materials
 - c. Approved Training Schedule

C. Delivery of Training Material to Trainees

1. Thirty (30) Days prior to first scheduled training session provide to the Owner copies of training materials. Provide one complete copy for each student scheduled to attend the corresponding session.

D. Training Location and Equipment Coordination

1. The Contractor to coordinate locations for training sessions and availability of required support services (power, HVAC, etc)
2. Audio/Visual (A/V) Equipment
 - a. Instructor shall be responsible for provided all A/V equipment required to conduct their prepared training program/module.

3.2. INSTRUCTION

A. Training is to be performed prior to Substantial Completion. Coordinate the schedule with Owner's requirements.

B. Occupant Training Module

1. Conduct training sessions that would ensure all building occupants can attend one 30-60 minute training session.
2. Distribute facility quick reference card to each participant at the end of the training session and review the card at the conclusion of the session.

C. Systems Training Modules

1. Conduct training sessions that would ensure all operations & maintenance staff can to attend one classroom training session and one field training session.
2. Training should be given during regular work hours (for all shifts) on such dates and times that are selected by the Owner. The training may be divided into more than one session at the discretion of the Owner.
3. For each major system as specified in Section 1.7 conduct a 4-8 hour general maintenance training session in the class room, and a separate 4 hour field training session.
4. For each sub-system as specified in Section 1.7 conduct a 4-8 hour shop specific training session in the class room, and a separate 4 hour field training session.
5. Conduct an independent 40 hour classroom training session dedicated to the BMS for the HVAC technicians.
6. The number of attendees at these sessions will be kept below twenty (20) for classroom instruction and below six (6) for field instruction.
7. Following the field instruction administer a brief (ten question) quiz to check retention of the information. Quizzes *shall not* have trainee names on them.

3.3. TRAINING CLOSE OUT

- A. Provide updated training plan and schedule with the close out submittal.
- B. Provide all training materials formatted and packaged in accordance with these specifications.
- C. Present program overview to Owner and Project Team highlighting successes and lessons learned.

END OF SECTION 018100

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 018113

SUSTAINABLE DESIGN REQUIREMENTS (LEED BUILDING)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. LEED BUILDING - GENERAL REQUIREMENTS:

The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

B. Related Sections include the following:

1. Division 1, Section 017419 - Construction Waste Management and Disposal
2. Division 1, Section 018113.3 – Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings
3. Division 1, Section 018119 - Construction IAQ Requirements

1.3 DEFINITIONS

- A. LEED: The Leadership in Energy & Environmental Design rating system developed by the United States Green Building Council. LEED for New Construction (NC), Version 2.2, is the rating system used for this project.
- B. Rapidly Renewable Materials: Materials made from agricultural products that are typically harvested within a ten-year or shorter cycle. Rapidly renewable materials include products made from bamboo, cotton, flax, jute, straw, sunflower seed hulls, vegetable oils, or wool.

- C. Regionally Manufactured Materials: Materials that are manufactured within a radius of 500 miles from the Project location. Manufacturing refers to the final assembly of components into the building product that is installed at the Project site.
- D. Regionally Extracted, Harvested, or Recovered Materials: Materials that are extracted, harvested, or recovered and manufactured within a radius of 500 miles from the Project site.
- E. 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).
 - 1. 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.
 - 2. Discarded materials from one manufacturing process that are used as constituents in another manufacturing process are pre-consumer recycled materials.

1.4 LEED PROVISIONS

- A. The provisions to achieve a LEED Silver rating are integrated within the project construction documents and specifications. Contractors are specifically directed to the "LEED BUILDING Performance Criteria" and "LEED BUILDING Submittals" sections within each specification. 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.
- B. A LEED Scorecard, which summarizes the targeted LEED points for this project, is included as an attachment to this section. The scorecard is provided for the contractor's reference only.

1.5 LEED BUILDING SUBMITTALS

- A. Scope: LEED BUILDING Submittals are required for all installed materials included under Divisions 2 through 14 of this specification. For specification Divisions 15 and 16, LEED BUILDING Submittals are only required for field-applied adhesives, sealants, paints and coatings.
- 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 section. The detailed requirements for the LEED BUILDING Submittals are defined in Item C below.
- C. Detailed Requirements: Items 1-11 below define the information and documents to be provided for each type of LEED BUILDING Submittal.
 - 1. ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM (EBMCF): Information to be supplied for this form (blank copy attached at end of this Section) shall

include some or all of the following items, as identified in the LEED Submittal Requirements of each specification section:

- a) Cost breakdowns for the materials included in the contractor or sub-contractor's scope of work. Cost reporting shall include itemized material costs (excluding the contractor's labor, equipment, overhead and profit).
 - b) The percentages (by weight) of post-consumer and/or post-industrial recycled content in the supplied product(s).
 - c) Identification (Yes/No) of materials manufactured within 500 miles of the project site **AND** containing raw materials harvested or extracted within 500 miles of the project site.
 - d) Volatile Organic Compound (VOC) content of all field-applied adhesives, sealants, paints, and coatings, listed in grams/liter or lbs./gallon.
 - e) The amount of "FSC Certified" wood product(s) used.
2. EBMCF BACK-UP DOCUMENTATION: These documents are used to validate the information provided on the EBMCF (except cost data). For each material listed on the EBMCF, provide documentation to certify the material's LEED BUILDING attributes, as applicable:
- a) Recycled content: Provide published product literature or letter of certification on the manufacturer's letterhead certifying the amounts of post-consumer and/or post-industrial content.
 - b) Regional manufacturing AND Regional raw materials (within 500 miles): Provide 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 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 500 miles of the project site, provide the percentage (by weight) that these materials comprise in the complete product.
 - c) VOC content: Provide Material Safety Data Sheets (MSDS) certifying the Volatile Organic Compound (VOC) content of the adhesive, sealant, paint, or coating products. VOC content is to be reported in grams/liter or lbs./gallon. If the MSDS does not show the product's VOC content, this information must be provided through other published product literature from the manufacturer, or stated in a letter of certification from the product manufacturer on the manufacturer's letterhead.
3. PRODUCT CUT SHEETS: Provide product cut sheets with the Contractor's or sub-contractor's stamp, confirming that the submitted products are the products installed in the Project.

4. **CERTIFICATION OF COMPOSITE WOOD OR AGRIFIBER RESINS:** For all composite wood, engineered wood and agrifiber products (including plywood, particleboard, and medium density fiberboard), provide published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying that that the products do not contain added urea-formaldehyde resins.
5. **CERTIFICATION OF COMPOSITE WOOD OR AGRIFIBER LAMINATING ADHESIVES:** For all laminating adhesives used with composite wood, engineered wood and agrifiber products (e.g., adhesives used to laminate wood veneers to an engineered wood substrate), provide published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying that that the adhesive products do not contain urea-formaldehyde.
6. **FSC-CERTIFIED WOOD:**
 - a. Provide vendor invoices for each wood product that has been harvested in accordance with the "FSC Principles and Criteria" for well-managed forests developed by the Forest Stewardship Council (FSC).
 - b. For assemblies, provide the percentage (by cost and by weight) of the assembly that is FSC-certified wood.
7. **GREEN SEAL COMPLIANCE:** Provide published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying that the following product types comply with the VOC limits and chemical component restrictions developed by the Green Seal organization of Washington, DC:
 - a. Topcoat paints: refer to Green Seal standard GS-11 (1st edition, May 1993)
 - b. Anti-corrosive and Anti-rust paints: refer to Green Seal standard GC-03 (2nd Edition, January 1997)
 - c. Aerosol Adhesives: refer to Green Seal standard GS-36 (1st edition, October 2000)
8. **HIGH ALBEDO ROOFING MATERIALS:** For exposed roofing membranes, pavers, and ballast products, provide published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying the following minimum Solar Reflectance Index (SRI) values:
 - a. 78 for low-sloped roofing applications (slope \leq 2:12)
 - b. 29 for steep-sloped roofing applications (slope \geq 2:12)SRI values shall be calculated according to ASTM E 1980. Reflectance shall be measured according to ASTM E 903, ASTM E 1918, or ASTM C 1549. Emittance shall be measured according to ASTM E 408 or ASTM C 1371.
Vegetated roof surfaces are exempt from the SRI criteria.
9. **LOW MERCURY LAMPS:** For all fluorescent, compact fluorescent, and HID lamps installed in the project, provide published product literature or letter from the manufacturer (on the manufacturer's letterhead) verifying:
 - a. The mercury content or content range per lamp in milligrams or picograms;
 - 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.In addition, provide the total number of each lamp type installed in the project.

D. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the LEED Consultant for review. Incomplete or inaccurate LEED BUILDING submittals may be used as the basis for the LEED Consultant's rejection of products or assemblies. Incomplete or inaccurate LEED BUILDING Submittals may be used as the basis for rejecting the submitted products or assemblies.

E. LEED Action Plans

1. Construction Waste Management Plan- Refer to Section 01505, Construction Waste Requirements for detailed submittal requirements.
2. Construction IAQ Management Plan- Refer to Section 01515, Construction IAQ Requirements, for detailed submittal requirements.

PART 2 - PRODUCTS – Not Used

PART 3 - EXECUTION – Not Used

END OF SECTION 018113



LEED for New Construction v2.2
Registered Project Checklist
REVISED CHECKLIST, 10.09.09
75 % Construction Documents

Project Name: Bronx River Art Center
Project Address: 1087 East Tremont Avenue

Yes ? No

5 3 6 Sustainable Sites 14 Points

Y	Prereq 1	Construction Activity Pollution Prevention	Required
1	Credit 1	Site Selection	1
1	Credit 2	Development Density & Community Connectivity	1
1	Credit 3	Brownfield Redevelopment	1
1	Credit 4.1	Alternative Transportation, Public Transportation Access	1
1	Credit 4.2	Alternative Transportation, Bicycle Storage & Changing Rooms	1
1	Credit 4.3	Alternative Transportation, Low-Emitting & Fuel-Efficient Vehicles	1
1	Credit 4.4	Alternative Transportation, Parking Capacity	1
1	Credit 5.1	Site Development, Protect or Restore Habitat	1
1	Credit 5.2	Site Development, Maximize Open Space	1
1	Credit 6.1	Stormwater Design, Quantity Control	1
1	Credit 6.2	Stormwater Design, Quality Control	1
1	Credit 7.1	Heat Island Effect, Non-Roof	1
1	Credit 7.2	Heat Island Effect, Roof	1
1	Credit 8	Light Pollution Reduction	1

Yes ? No

4 1 Water Efficiency 5 Points

1	Credit 1.1	Water Efficient Landscaping, Reduce by 50%	1
1	Credit 1.2	Water Efficient Landscaping, No Potable Use or No Irrigation	1
1	Credit 2	Innovative Wastewater Technologies	1
1	Credit 3.1	Water Use Reduction, 20% Reduction	1
1	Credit 3.2	Water Use Reduction, 30% Reduction	1

7 5 3 Energy & Atmosphere 17 Points

Y	Prereq 1	Fundamental Commissioning of the Building Energy Systems	Required
Y	Prereq 2	Minimum Energy Performance	Required
Y	Prereq 3	Fundamental Refrigerant Management	Required

*Note for EAc1: All LEED for New Construction projects registered after June 26th, 2007 are required to achieve at least two (2) points under

EAc1

6 4	Credit 1	Optimize Energy Performance	1 to 10
		<input type="checkbox"/> 10.5% New Buildings or 3.5% Existing Building Renovations	1
		<input type="checkbox"/> 14% New Buildings or 7% Existing Building Renovations	2
		<input type="checkbox"/> 17.5% New Buildings or 10.5% Existing Building Renovations	3
		<input type="checkbox"/> 21% New Buildings or 14% Existing Building Renovations	4
		<input type="checkbox"/> 24.5% New Buildings or 17.5% Existing Building Renovations	5
		6 <input checked="" type="checkbox"/> 28% New Buildings or 21% Existing Building Renovations	6
		<input type="checkbox"/> 31.5% New Buildings or 24.5% Existing Building Renovations	7
		<input type="checkbox"/> 35% New Buildings or 28% Existing Building Renovations	8
		<input type="checkbox"/> 38.5% New Buildings or 31.5% Existing Building Renovations	9
		<input type="checkbox"/> 42% New Buildings or 35% Existing Building Renovations	10
1	Credit 2	On-Site Renewable Energy	1 to 3
		<input type="checkbox"/> 2.5% Renewable Energy	1
		<input type="checkbox"/> 7.5% Renewable Energy	2
		<input type="checkbox"/> 12.5% Renewable Energy	3
1	Credit 3	Enhanced Commissioning	1
1	Credit 4	Enhanced Refrigerant Management	1
1	Credit 5	Measurement & Verification	1
1	Credit 6	Green Power	1

continued...

Bronx River Art Center
Bronx, NY

Sustainable Design Requirements (LEED Building)
018113 Page 6 of 8

Yes ? No			Materials & Resources		13 Points
5	7	1			
Y			Prereq 1	Storage & Collection of Recyclables	Required
1			Credit 1.1	Building Reuse , Maintain 75% of Existing Walls, Floors & Roof	1
	1		Credit 1.2	Building Reuse , Maintain 95% of Existing Walls, Floors & Roof	1
		1	Credit 1.3	Building Reuse , Maintain 50% of Interior Non-Structural Elements	1
1			Credit 2.1	Construction Waste Management , Divert 50% from Disposal	1
1			Credit 2.2	Construction Waste Management , Divert 75% from Disposal	1
	1		Credit 3.1	Materials Reuse , 5%	1
	1		Credit 3.2	Materials Reuse , 10%	1
1			Credit 4.1	Recycled Content , 10% (post-consumer + ½ pre-consumer)	1
	1		Credit 4.2	Recycled Content , 20% (post-consumer + ½ pre-consumer)	1
1			Credit 5.1	Regional Materials , 10% Extracted, Processed & Manufactured Regionally	1
	1		Credit 5.2	Regional Materials , 20% Extracted, Processed & Manufactured Regionally	1
	1		Credit 6	Rapidly Renewable Materials	1
	1		Credit 7	Certified Wood	1
Yes ? No			Indoor Environmental Quality		15 Points
11		4			
Y			Prereq 1	Minimum IAQ Performance	Required
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	Required
1			Credit 1	Outdoor Air Delivery Monitoring	1
1			Credit 2	Increased Ventilation	1
1			Credit 3.1	Construction IAQ Management Plan , During Construction	1
1			Credit 3.2	Construction IAQ Management Plan , Before Occupancy	1
1			Credit 4.1	Low-Emitting Materials , Adhesives & Sealants	1
1			Credit 4.2	Low-Emitting Materials , Paints & Coatings	1
	1		Credit 4.3	Low-Emitting Materials , Carpet Systems	1
1			Credit 4.4	Low-Emitting Materials , Composite Wood & Agrifiber Products	1
	1		Credit 5	Indoor Chemical & Pollutant Source Control	1
	1		Credit 6.1	Controllability of Systems , Lighting	1
	1		Credit 6.2	Controllability of Systems , Thermal Comfort	1
1			Credit 7.1	Thermal Comfort , Design	1
1			Credit 7.2	Thermal Comfort , Verification	1
1			Credit 8.1	Daylight & Views , Daylight 75% of Spaces	1
1			Credit 8.2	Daylight & Views , Views for 90% of Spaces	1
Yes ? No			Innovation & Design Process		5 Points
4		1			
1			Credit 1.1	Innovation in Design : WE Credit 3 40% water savings	1
1			Credit 1.2	Innovation in Design : SS Credit 4.1 Alternative Transportation	1
		1	Credit 1.3	Innovation in Design : SS Credit 7.2 Heat Island Effect, Roof	1
1			Credit 1.4	Innovation in Design : Publicize project's sustainable achievements	1
1			Credit 2	LEED® Accredited Professional	1
Yes ? No			Project Totals (pre-certification estimates)		69 Points
36	15	16			
Certified: 26-32 points, Silver: 33-38 points, Gold: 39-51 points, Platinum: 52-69					

ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM

Contractor Name: _____
Contractor Contact: _____
Telephone Number: _____

Material Description	Material Cost ¹ (less Labor & Equip.)	Recycled Content Post Consumer ² %	Post Industrial ³ %	Local Materials (yes or no) Raw Resources ³ originate from and product Manufactured ⁴ w/in 500 miles of project site	VOC content ⁶ VOC content listed in grams/liter or pounds/gallon	Wood ⁷ FSC Certified ⁶ (Yes or No)
Product/ Manufacturer						

Definitions:

- ¹**Material Cost:** Material Cost is the cost of the materials as it would appear on the manufacturer's or distributor's invoice to the contractor or subcontractor. It does not include labor or equipment costs associated with the installation of the material.
- ²**Post-Consumer Recycled Content:** Material or finished product that has served its intended consumer use and has been discarded by the consumer for recovery after the consumer has employed the intended use of the product. (e.g., a plastic bottle from a soft drink).
- ³**Post-Industrial Recycled Content:** recovered industrial and manufacturing materials that are diverted from municipal solid waste for the purpose of collection, recycling and disposition. Scrap raw materials that can be reused in the same manufacturing process from which they are recovered are not considered Post-Industrial Recycled Content. Fly-ash and synthetic gypsum, because they are waste products from coal burning electricity plants, are examples of Post-Industrial recycled materials.
- ⁴**Manufacturing:** Manufacturing, as defined by the USGBC, refers to the final assembly of components into a building product that is furnished and installed by the tradesmen. For example, if the hardware comes from Seoul, South Korea, the lumber from Vancouver, British Columbia and the joist is assembled in Kent Washington; then the location of the final assembly is Kent Washington.
- ⁵**Raw Resources:** Raw resources refers to the origin of building product components in regard to the location from which they are extracted, harvested, or recovered.
- ⁶**VOC Content:** The quantity of volatile organic compounds contained in products such as adhesives, sealants and architectural coatings. VOC content is to be reported in grams/liter or lbs/gallon
- ⁷**FSC Certified:** FSC Certified refers to Certification from the Forest Stewardship Council. This column is only applicable to wood products

Contractor Certification:

I, _____ a duly authorized representative of _____ hereby certify that the material information contained herein is an accurate representation of the material qualifications to be provided by us, as components of the final building construction. Furthermore, I understand that any change in such qualifications during the purchasing period will require prior written approval from the Construction Manager and LEED Consultant.

Signature _____ of _____ Authorized _____ Representative: _____ Date: _____

Bronx River Art Center
Bronx, NY

Sustainable Design Requirements (LEED Building)
018113 Page 8 of 8

12/21/2012

SECTION 018113.3

VOLATILE ORGANIC COMPOUNDS (VOC) LIMITS FOR ADHESIVES, SEALANTS,
PAINTS AND COATINGS

PART 1 - GENERAL

1.01 SUMMARY

- A. This Section includes requirements for volatile organic compound (VOC) content in adhesives, sealants, paints and coatings used for the project

1.02 RELATED SECTIONS: The following Sections contain requirements that relate to this Section:

- A. All sections in the Specifications with adhesive, sealant or sealant primer applications. Section 018113 sustainable Design Requirements (LEED BUILDING), shall be followed.
- B. Division 1, Section 018113.3 : "Construction IAQ Management", for requirements for the Construction IAQ Management Plan. (LEED BUILDING)
- C. Division 9, Section 099100 PAINTING AND FINISHING

1.03 GENERAL REQUIREMENTS

- A. The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest extent. Substitutions,

Bronx River Art Center

(VOC) Limits for Adhesives, Sealants, Paints and Coatings

Bronx, NY

018113.3 Page 1 of 8

12/21/2012

or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the environmental goals.

1.04 REFERENCES

- A. Rule 1168 – “Adhesive and Sealant Applications”, amended 7 January 2005: South Coast Air Quality Management District (SCAQMD), State of California, www.aqmd.gov
- B. Rule 1113 - “Architectural Coatings”, amended 9 July 2004: South Coast Air Quality Management District (SCAQMD), State of California, www.aqmd.gov
- C. Green Seal Standard GS-11- “Paints”, of Green Seal, Inc., Washington, DC, www.greenseal.org
- D. Green Seal Standard GC-03- “Anti-Corrosive Paints”, of Green Seal, Inc., Washington, DC, www.greenseal.org

1.05 VOC REQUIREMENTS FOR INTERIOR ADHESIVES

- A. The volatile organic compound (VOC) content of adhesives, adhesive bonding primers, or adhesive primers used in this project shall not exceed the limits defined in Rule 1168 – “Adhesive and Sealant Applications” of the South Coast Air Quality Management District (SCAQMD), of the State of California.
- B. The VOC limits defined by SCAQMD are as follows. All VOC limits are defined in grams per liter, less water and less exempt compounds.

1.06 GENERAL

- A. Unless otherwise specified below, the VOC content of all adhesives, adhesive bonding primers, or adhesive primers shall not be in excess of **250 grams per liter**.

12/21/2012

B. For specified building construction related applications, the allowable VOC content is as follows:

1. Architectural Applications:

Indoor carpet adhesive	50
Carpet pad adhesive	50
Wood flooring adhesive	100
Rubber floor adhesive	60
Subfloor adhesive	50
Ceramic tile adhesive	65
VCT and asphalt tile adhesive	50
Drywall and panel adhesive	50
Cove base adhesive	50
Multipurpose construction adhesive	70
Structural glazing adhesive	100

2. Specialty Applications:

PVC welding	510
CPVC welding	490
ABS welding	325
Plastic cement welding	250
Adhesive primer for plastic	550
Contact Adhesive	80

12/21/2012

Special Purpose Contact Adhesive	250
Structural Wood Member Adhesive	140
Sheet Applied Rubber Lining Operations	850

3. Substrate Specific Applications:

Metal to metal	30
Plastic foams	50
Porous material (except wood)	50
Wood	30
Fiberglass	80

1.07 VOC REQUIREMENTS FOR INTERIOR SEALANTS

A. The volatile organic compound (VOC) content of sealants, or sealant primers used in this project shall not exceed the limits defined in Rule 1168 – “Adhesive and Sealant Applications” of the South Coast Air Quality Management District (SCAQMD), of the State of California.

B. The VOC limits defined by SCAQMD are as follows. All VOC limits are defined in grams per liter, less water and less exempt compounds.

1. Sealants:

Architectural	250
Other	420

2. Sealant Primer:

Bronx River Art Center

(VOC) Limits for Adhesives, Sealants, Paints and Coatings

Bronx, NY

018113.3 Page 4 of 8

12/21/2012

Architectural – Nonporous	250
Architectural – Porous	775
Other	750

a.

1.08 VOC REQUIREMENTS FOR INTERIOR PAINTS

A. Paints and Primers:

Paints and primers used in non-specialized interior applications (i.e., for wallboard, plaster, wood, metal doors and frames, etc.) shall meet the VOC limitations of the Green Seal Paint Standard GS-11, of Green Seal, Inc., Washington, DC. Product-specific environmental requirements are as follows:

1. Volatile Organic Compounds:

- a. The VOC concentrations (in grams per liter) of the product shall not exceed those listed below as determined by U. S. Environmental Protection Agency (EPA) Reference Test Method 24.

Interior Paints and Primers:

Non-flat: 150 g/l

Flat: 50 g/l

The calculation of VOC shall exclude water and tinting color added at the point of sale.

B. Anti- Corrosive and Anti-Rust Paints

Anti-corrosive and anti-rust paints applied to interior ferrous metal substrates shall meet the VOC limitations of the Green Seal Paint Standard GC-03, of Green Seal, Inc., Washington, DC. Product-specific environmental requirements are as follows:

1. Volatile Organic Compounds:

Bronx River Art Center

(VOC) Limits for Adhesives, Sealants, Paints and Coatings

Bronx, NY

018113.3 Page 5 of 8

12/21/2012

- a. The VOC concentrations (in grams per liter) of the product shall not exceed those listed below as determined by U. S. Environmental Protection Agency (EPA) Reference Test Method 24.

Anti-Corrosive and Anti-Rust Paints:

250 g/l

The calculation of VOC shall exclude water and tinting color added at the point of sale.

1.09 VOC REQUIREMENTS FOR INTERIOR COATINGS

- A. Clear wood finishes, floor coatings, stains, sealers, and shellacs applied to the interior shall meet the VOC limitations defined in Rule 1113, "Architectural Coatings" of SCAQMD, of the State of California. The VOC limits defined by SCAQMD, based on 7/9/04 amendments, are as follows. VOC limits are defined in grams per liter, less water and less exempt compounds.

1. Clear Wood Finishes

Varnish	350
Sanding Sealers	350
Lacquer	550

2. Shellac

Clear	730
Pigmented	550

3. Stains

250

4. Floor Coatings

100

Bronx River Art Center

(VOC) Limits for Adhesives, Sealants, Paints and Coatings

Bronx, NY

018113.3 Page 6 of 8

12/21/2012

5. Waterproofing Sealers	250
6. Sanding Sealers	275
7. Other Sealers	200

The calculation of VOC shall exclude water and tinting color added at the point of sale

END OF SECTION

12/21/2012

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 018119CONSTRUCTION IAQ REQUIREMENTS

PART 1 - GENERAL

1.01 CONSTRUCTION IAQ MANAGEMENT GOALS FOR THE PROJECT

- A. The City of New York has established that this Project shall minimize the detrimental impacts on Indoor Air Quality (IAQ) resulting from construction activities. Factors that contaminate indoor air, such as dust entering HVAC systems and ductwork, improper storage of materials on-site, poor housekeeping, shall be minimized.

1.02 SUMMARY

- A. This Section includes requirements for the development of a Construction Indoor Air Quality Management Plan (alternately referred to as "the Plan"). Develop the Plan for approval by the LEED Consultant. The Plan shall be implemented throughout the duration of the project construction, and shall be documented as outlined in the Submittal Requirements of Item 1.08 below. The Plan is included as part of the LEED BUILDING requirements for the project.

1.03 RELATED SECTIONS

- A. All sections of the Specifications related to interior construction, MEP systems, and items affecting indoor air quality.
- B. Division 1, Section 018113.3 – Volatile Organic Compound (VOC) Limits For Adhesives And Sealants (LEED BUILDING).
- C. Section 099100 – Painting and Finishing.

1.04 DEFINITIONS

- A. Volatile Organic Compounds (VOC's): 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 VOC's are harmful, but many of those contained within building products contribute to the formation of smog and may irritate building occupants by their smell and/or health impact.
- B. Materials that act as "sinks" for VOC contamination: Absorptive materials, typically dry and soft (such as textiles, carpeting, acoustical ceiling tiles and gypsum board) that readily absorb VOC's emitted by "source" materials and release them over a prolonged period of time.
- C. Materials that act as "sources" for VOC contamination: Products with high VOC contents that emit VOC's 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 flooring coverings with plasticizers and engineered wood with formaldehyde).

1.05 REFERENCES, RESOURCES

- A. "IAQ Guidelines for Occupied Buildings Under Construction", First Edition, November 1995, The Sheet Metal and Air Conditioner Contractors National Association (SMACNA). (703) 803-2980, www.smacna.org.
- B. ANSI/ASHRAE 52.2-1999, "Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size", www.ashrae.org

1.06 LEED BUILDING GENERAL REQUIREMENTS

- A. Implement practices and procedures to meet the project's environmental performance goals, which include achieving LEED Certification. Specific project goals that may impact this area of work include: use of recycled-content materials; use of locally-manufactured materials; use of low-emitting materials; use of certified wood products; 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 shall not be allowed if such changes compromise the stated LEED BUILDING Performance Criteria.

1.07 CONSTRUCTION IAQ MANAGEMENT PLAN

- A. The Contractor shall prepare and submit a Construction IAQ Management Plan to the LEED Consultant for approval. The Construction IAQ Management Plan shall meet the following criteria:
 - 1. Construction activities shall be planned to meet or exceed the minimum requirements of the Sheet Metal and Air Conditioning National Contractors' Association (SMACNA) "IAQ Guidelines for Occupied Buildings under Construction", First Edition, 1995.
 - 2. Absorptive materials shall be protected from moisture damage when stored on-site and after installation.
 - 3. If air handlers are to be used during construction, filtration with a Minimum Efficiency Reporting Value (MERV) of 8 must be at each return air grill, as determined by ASHRAE 52.2-1999.
 - 4. A "Sequence of Finish Installation Plan" shall be developed, highlighting measures to reduce the absorption of VOCs by materials that act as "sinks".
 - 5. Upon approval of the Plan by the LEED Consultant, it shall be implemented through the duration of the construction process, and documented in accordance with the Submittal Requirements of Item 1.08 below.
- B. Further description of the Construction IAQ Management Plan requirements is 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 shall be organized in accordance with the SMACNA format, and shall address measures to be implemented in each of the five categories (including subsections). All subsections shall be listed in the Plan; items that are not applicable for this project should be listed as such.

- a. HVAC Protection
 - Central Filtration
 - Supply Side
 - Duct Cleaning
 - b. Source Control
 - Product Substitution
 - Modifying Equipment Operation
 - Changing Work Practices
 - Local Exhaust
 - Air Cleaning
 - Cover or Seal
 - c. Pathway Interruption
 - Depressurize Work Area
 - Pressurize Occupied Space
 - Erect Barriers to Contain Construction Areas
 - Relocate Pollutant Sources
 - Temporarily Seal the Building
 - d. Housekeeping
 - e. Scheduling
2. Protect of Materials from Moisture Damage: As part of the "Housekeeping" section of the Construction IAQ Management Plan, measures to prevent installed materials or material stored on-site from moisture damage shall be described. This section should also describe measures to be taken if moisture damage does occur to absorptive materials during the course of construction.
 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 shall be provided. The description shall 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 shall be installed after the installation of materials or finishes which have high short-term emissions of VOC's, 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. Implementation and Coordination: Implement the Construction IAQ Management Plan, and coordinate the Plan with all affected trades. Designate one individual as the Construction IAQ Representative, who will be responsible for communicating the progress of the Plan with the LEED Consultant on a regular basis, 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.

1.08 SUBMITTALS

The Construction IAQ Representative shall submit the following LEED-required records and documents:

- A. A copy of the Construction IAQ Management Plan as defined in section 1.07 of this specification.
- B. Product cut-sheets for all filtration media used during construction and installed immediately prior to occupancy, with MERV values highlighted. Cut sheets shall be submitted with the Contactor's or Subcontractor's 'approved' stamp as confirmation that the products are the products installed on the project.
- C. Provide the LEED Consultant with a minimum of 18 photographs comprising of at least six photographs taken on three different occasions during construction. The photographs shall 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 shall include integral date stamping, and shall 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.

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

3.1 BUILDING AIR PURGING (FLUSH OUT)

- A. Purging must be conducted after construction and immediately prior to initial occupancy, for a period of at least two weeks, as follows:
1. After construction ends and with all interior finishes installed, new MERV 13 filtration media is installed and the building is flushed out by supplying 100% outside air for a minimum of two weeks **-OR-** total air volume of 14,000 ft³ of outdoor air per ft² of floor area while maintaining an internal temperature of at least 60° F and, where mechanical cooling is operated, relative humidity no higher than 60%..
 2. After flush-out, new MERV 13 filters must replace all filters except those solely processing outside air.

END OF SECTION 018119

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 018200 - OPERATION & MAINTENANCE DATA

PART 1 – GENERAL

1.1. RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specifications Sections, apply to this Section
- B. Reserved

1.2. SUMMARY

- A. This Specification Section addresses the administrative and procedural requirements for preparing operation and maintenance manuals and information for this project and the associated installed systems.
- B. Operation and Maintenance Manuals shall be prepared under this contract for the following systems, in accordance with the requirements and procedures as documented in this Specification.

1.3. DEFINITIONS

- A. **CAUTION:** Highlights an operating or maintenance procedure, practice, or condition, statement, etc., that, if not strictly observed, could result in damage to or destruction of equipment, loss of mission effectiveness, or health hazards to personnel.
- B. **Component:** An individual piece of equipment or part that works within a process or system to support overall function.
- C. **NOTE:** Highlights an essential operating or maintenance procedure, condition or statement.
- D. **SOMM:** System Operation & Maintenance Manual
- E. **System:** An organized collection of components, parts, equipment, or subsystems united by a regular interaction.
- F. **WARNING:** Highlights an operating or maintenance procedure, practice, condition, or statement, etc., that, if not strictly observed, could result in injury to or death of personnel.

1.4. SUBMITALS

- A. **Preliminary Submittal:** The purpose of this submittal is to provide samples of the type and quality of materials and content to be provided under this specification section. The following items are to be provided within **421** days of Notice to Proceed (NTP).

1. Master Table of Contents
 2. Index Tab Layout and Vendor Contact Information
 3. Sample Binder Cover and Spine
 4. Sample Binders, one for each size being used
 5. Sample Section of Part I – Facility Information
 6. Sample electronic files of the Master Table of Contents with links to the Sample Section listed in 5 above, Sample Section listed in 5 above, a scanned submittal and a scanned shop drawing on CD-ROM disk with sample label format.
- B. **Pre-Final Submittal**: This submittal is intended to show ninety (90) to ninety-five (95) percent completion of the SOMM. Any items that are not complete are to be listed in a separate document titled “SOMM Items Outstanding”. This submittal is due for delivery **630** days from Notice to Proceed (NTP). The submittal package shall consist of the following items:
1. “SOMM Items Outstanding” Document
 2. Part I – Facility Information
 3. Part II – System Information
 4. Part III – Product Data (Index Only)
 5. Electronic SOMM Link Map
- C. **Final Review Submittal**: The purpose of this submittal is to provide the owner with a final review of the manual prior to creation of the electronic version and its associated hyperlinks. Any of the items listed in the “SOMM Items Outstanding” document should have been addressed, with the corrective actions detailed on the updated list. The submittal package shall consist of the following items:
1. Updated “SOMM Items Outstanding” Document
 2. Part I – Facility Information Binder w/ Table of Contents and Tabs
 3. Part II – System Information Binder(s) w/ Table of Contents and Tabs
 4. Part III – Product Data Binder(s) w/ Table of Contents and Tabs
 5. Updated Electronic SOMM Link Map
- D. **Final Submittal**: This submittal completes the work under this specification. If acceptable to the Owner, the contractor may request that replacement pages be submitted in lieu of new binders to incorporate comments on the Final Review Submittal. If acceptable the Contractor must supply the personnel to make the replacements in each copy of the manual. The submittal shall consist of the following:
1. Part I – Facility Information Binder w/ Table of Contents and Tabs
 2. Part II – System Information Binder(s) w/ Table of Contents and Tabs
 3. Part III – Product Data Binder(s) w/ Table of Contents and Tabs
 4. CD-ROM(s) containing all electronic files used in creation of the manual in their native format.
 5. CD-ROM(s) containing electronic SOMM files with hyperlinks between sections as specified by this section.
- E. **Submittal Quantities**: The quantities of submittals detailed above will be as follows:
- | Owner | Design Team | Commissioning Agent |
|-------|-------------|---------------------|
|-------|-------------|---------------------|

Preliminary	1	1	1
Pre-Final	2	1	1
Final Review	2	1	1
Final	3	1	0*

*** The Final Review copy provided to the Commissioning Agent will be turned over to the Owner after review of the Final**

F. Warranty Binder

1. Provide one (1) binder with a copy of each warranty to the Commissioning Authority (Dome-Tech Commissioning) for review.

1.5. DOCUMENTATION FORMAT

A. Printed Documents

1. Printed documents shall be produced on 8½"X11" for text and up to 11"X17" for drawings and diagrams.
2. Printed text documents shall be double sided within sections.
3. Documents shall be bound along the left side of the document using the 11" edge.
4. Printed documents shall be suitable for binding using three ring binders.

B. Electronic Documents

1. All files used in the production of the operation and maintenance documentation shall be provided in their native file format.
2. In addition the documentation shall be provided in a web browser compatible format such as HTML, PDF, or browser supported graphical formats.
3. The contractor shall provide browser navigation links within the browser compatible files connecting the documents to each other and central index pages.
4. Files shall be submitted on CD-R discs with appropriate links between documents.

1.6. COORDINATION

- A. The preparation of the SOMM shall be coordinated with the Training requirements specified under Section 018100.
- B. Only approved submittals are to be referenced in the SOMM.

PART 2. PRODUCTS

2.1. BINDERS

- A. Final documents produced under this specification section shall be submitted in vinyl three ring binders with pockets on the spine and front of the binder for placement of printed material with volume title and content information.
- B. Binders up to 3" are acceptable, binders shall be of the following types:
 1. Sizes up to 1"

- a. Slant Ring Type
- 2. Sizes up to 3"
- a. Swing Hinge Type
- b. Telescoping Post Type

2.2. INDEX TABS

- A. Provide machine printed dividers with integrated tabs. Dividers and tabs shall have a mylar overlay for reinforcing and protection.
- B. Index dividers shall be letter size heavy weight paper with ½" tab extensions with printed text on both sides of the tab.

C. System Operation and Maintenance Manual Tabs

- 1. Part I – Facility Information
 - a. Provide ¼ cut tabs for each Section as follows:
 - i. Facility Description
 - ii. Basis of Design
 - iii. Sustainable Design
 - iv. Safety Hazards
 - v. Floor Plans
 - vi. Utility Connection Plans
 - vii. Warranty Information
 - viii. Equipment Listing
 - ix. HVAC Filters
 - x. Floor Coverings
 - xi. Wall Surfaces
 - xii. Ceiling Surfaces
 - xiii. Windows
 - xiv. Lighting Fixtures
 - xv. Plumbing Fixtures
 - xvi. Roofing
 - xvii. Inventory Requirements
 - xviii. As-Built Drawing List
 - xix. Facility Contact List
 - xx. Additional Info
- 2. Part II – System Information
 - a. Provide a full tab for each subsystem
 - b. Provide ¼ cut tabs for each system and subsystem as follows:
 - i. System Description
 - ii. System Operations
 - iii. System Maintenance
 - iv. System Reference
- 3. Part III – Product Data

- a. Provide ¼ cut tabs for each specification division
- b. Provide **colored** heavy weight paper dividers without tab extensions between specification sections.
 - i. Each specification section divider shall have the specification number, specification title, and an index of the submittals contained in the section.

D. Warranty Management Data

- 1. Provide ¼ cut tabs for each specification division.

2.3. SYSTEM OPERATION AND MAINTENANCE MANUAL (SOMM)

A. Part I – Facility Information

- 1. General Facility and System Description – Describe the functions of the facility. Detail the overall dimensions of the facility, number of floors, foundation type, expected number of occupants, and facility classifications. List and describe all facility systems listed in Part II – Systems Information and any special building features (i.e. cranes, elevators, etc.). Include photographs, marked up and labeled showing key operating components and overall facility appearance.
- 2. Basis of Design – Include the Basis of Design that shows the basic scope of work, assumptions and the original intentions of the A/E of record.
- 3. Sustainable Design – Include a listing of the elements of sustainable design which have been incorporated into the facility.
- 4. Safety Hazards - List all residual hazards identified in the *Requirements Hazard Analysis* as prepared by the A/E of record. Provide recommended safeguards for each identified hazard.
- 5. Floor Plans - Provide uncluttered, legible 11 by 17 inch floor plans (which include only room numbers, type or function of spaces, and overall facility dimensions on the floor plans. Do not include construction instructions, references, frame numbers, etc.).
- 6. Utility Connection and Cutoff Plans - Provide utility site and floor plans that indicate the exterior and main interior connection and cutoff points for all utilities. Include enough information to enable someone unfamiliar with the facility to quickly locate the connection and cutoff points. Do not include items such as contour lines, elevations, and subsurface information on the site plans. Indicate the room number, panel number, circuit breaker, valve number, etc., of each connection and cutoff point, and what that connection or cutoff point controls. These plans are in addition to the Floor Plans.
- 7. Warranty Information - List all warranties for products, equipment, components, and sub-components whose duration exceeds one year after Substantial Completion. Cross reference the list to the warranty copies included in Part II, Systems Information or in Part III, Product Data. For each warranty listed, indicate the applicable specification section, duration, start date, end date, and the point of contact for warranty fulfillment. Also, list or reference all specific operation and maintenance procedures that must be performed to keep the warranty valid. Provide one (1) additional binder separate from Part One with the warranties for each piece of equipment for review by Dome-Tech Commissioning Services.

8. Equipment Listing - Provide a table that lists the major equipment shown on the design equipment schedules. Show the item descriptions, locations, model numbers; and the names, addresses, and telephone numbers of the manufacturers, suppliers, contractors, and subcontractors.
9. HVAC Filters - Provide a table that lists the quantity, type, size, and location of each HVAC filter.
10. Floor Coverings - Provide a table that lists by room number (including hallways and common spaces), the type of space, type of floor covering and area of floor. The table will include a facility summary of the total area for each type of space and floor covering.
11. Wall Surfaces - Provide a table that lists by room number (including hallways and common spaces), the type of wall surface, and area of wall surface. The table will include a facility summary of the total area for each type of wall surface.
12. Ceiling Surfaces - Provide a table that lists by room number (including hallways and common spaces), the type of ceiling surface, and area of ceiling surface. The table will include a facility summary of the total area for each type of ceiling surface.
13. Windows - Provide a table that lists by room number (including hallways and common spaces), the type of window, window size, number of each size and type, and special features. The table will include a facility summary of the total number for each type and size of window.
14. Lighting Fixtures - Provide a table that lists by room number (including hallways and common spaces), the type of lighting fixture, number of lighting fixtures, type of bulbs or tubes, and number of bulbs and tubes. The table will include a facility summary of the total number of fixtures of each type and number of bulbs or tubes of each type.
15. Plumbing Fixtures - Provide a table that lists by room number, the number and type of plumbing and bathroom plumbing fixtures (for example, sinks, water closets, urinals, showers and drinking fountains).
16. Roofing - Provide the total area of each type of roof surface and system. Provide the name of the roofing product and system; manufacturer's, supplier's, and installer's names, addresses, and phone numbers. For each type of roof, provide a recommended inspection, maintenance and repair schedule that details checkpoints, frequencies, and prohibited practices.
17. Supply Inventory Requirements - Provide a list of maintenance and repair supplies (for example, spare parts, fuels, lubricants) required to ensure continued operation without unreasonable delays. Identify and list parts and supplies that have long purchase lead times.
18. As-Built Drawing List - Provide a list of the "as-built" or "record" drawings and specifications. Include drawing number and title. Identify where the drawings and specifications will be stored and filed.
19. Facility Contact List - Provide a master list of all project team members including sub-contractors and suppliers organized by company name with contact information including:
 - a. Company Name
 - b. Project Role
 - c. Point of Contact (POC) Name
 - d. POC Address
 - e. POC Phone Number
 - f. POC Fax Number
 - g. POC Email

- h. Company Website URL
- 20. Additional Info – an open section for expansion at a future date.

B. Part II – Systems Information

Prepare the information required for Part II, Systems Information using a **systems approach**. This approach requires that consideration be given to the entire system; that is, the interfaces of equipment, connections and material flow within the system. Include the following systems:

- HVAC Systems
- HVAC Components
- ATC/BMS Systems
- Life Safety tied into HVAC/ATC/BMS Systems
- Lighting Control
- Electrical Distribution
- Emergency Generator
- Emergency Power Systems

Use **Notes, Cautions and Warnings** throughout the Part II, Systems Information to emphasize important and critical instructions and procedures. Place notes, cautions and warnings immediately before the applicable instructions or procedures. Notes, cautions and warnings are defined at the beginning of this specification.

1. Operation

- a. System Description – Provide a detailed discussion of the system composition and operation. Include principles and theories necessary for an understanding of the system.
- b. Start-Up and Shutdown Procedures – Provide step by step instructions to bring systems from static to operational configurations and from operating to shutdown status.
- c. Normal Operating Instructions – Provide a discussion of normal operation and control of the system. Address operating norms and parameters with expected values for each component of the system. Supplement with control and wiring diagrams as required.
- d. Emergency Operating Instructions - Provide emergency operating procedures in the event of equipment malfunctions. Provide shutdown instructions for fires, explosions, spills, or other contingencies.
- e. System Flow Diagrams - Provide a flow diagram indicating system liquid, air (do not include ductwork) or gas flow during normal operations. Integrate all system components into the diagram. A compilation of non-integrated, flow diagrams for the individual system components are not acceptable.
- f. Diagrammatic Plans - Provide floor plans indicating the location of equipment and configuration of the system installation. Include the configuration of associated piping or wiring. Subordinate structural features to utility features.
- g. Environmental Considerations - Provide a listing of the equipment that requires special operation, reporting, testing, analysis or inspection to comply with federal, state or local environmental laws. Examples of possible list items include back flow

preventor inspections, underground storage tank testing, hazardous material or waste usage and storage documentation, and air pollution control devices. Each item in the list will include requirements for environmental operation, reporting, testing, analysis and inspection as well as references to respective implementing regulations, statutes, or policies.

- h. Field Test Reports - Provide Field Test Reports that apply to equipment associated with the system.
- i. Operator Servicing Requirements - Provide instructions for services to be performed by the operator such as lubrication, adjustments, and inspection.
- j. Safety Instructions - Provide a list of all personnel hazards and equipment safety precautions including recommended safeguards.
- k. Points/Valve List - Provide a list of all points/valves associated with the system. Show point/valve type, identification number, function, location and normal operating position or state.
- l. Operating Log - Provide forms, samples, and instructions for keeping necessary operating records.

2. Preventive Maintenance

- a. Preventive Maintenance Plan and Schedule - Provide a Preventive Maintenance (PM) plan using manufacturer's recommendations and sound engineering practice. Include all major pieces of equipment. Provide a check sheet that details maintenance tasks and associated frequencies. Also provide an annual schedule indicating when maintenance tasks should be performed such that work is spread as evenly as possible throughout the year.
- b. Preventive Maintenance Procedures - Provide a Task Card for each individual maintenance task identified on the PM Plan and Schedule. Include detailed PM procedures, safety instructions and precautions including Lock Out/Tag Out precautions, required skill level, number of personnel needed, frequency, special tools needed, and parts needed, and estimated time required to complete the task.
- c. Lubrication Schedule - Provide a lubrication schedule indicating types, grades, and capacities of lubricants for specific temperature ranges and applications.
- d. Preventive Maintenance Log - Provide a tabular form for recording the accomplishment of PM. Log must record date PM was performed, findings, action taken, parts used, time required to complete the work, and other data necessary to provide a good historical record of PM activities.

3. Repair

- a. Troubleshooting Guides and Diagnostic Techniques - Provide step- by-step procedures for diagnosing, isolating and correcting system malfunctions. The procedures shall clearly state indications or symptoms of trouble; the sequential instructions, including checks and tests to be performed and conditions to be sought, to determine the cause; and remedial measures to return the equipment and system to operating condition. Identify special test equipment required to perform the procedures. Start the troubleshooting guide at the system level and proceed to a level where detailed manufacturer's troubleshooting procedures for the system's components can be referenced.

- b. Repair Procedures - Provide repair instructions required to restore equipment to proper operating condition and standards. References must be specific as to location within the SOMM.
- c. Removal and Replacement Instructions - Provide or refer to the manufacturer's data for the instructions for the removal and replacement of equipment components. References must be specific as to location within the SOMM.

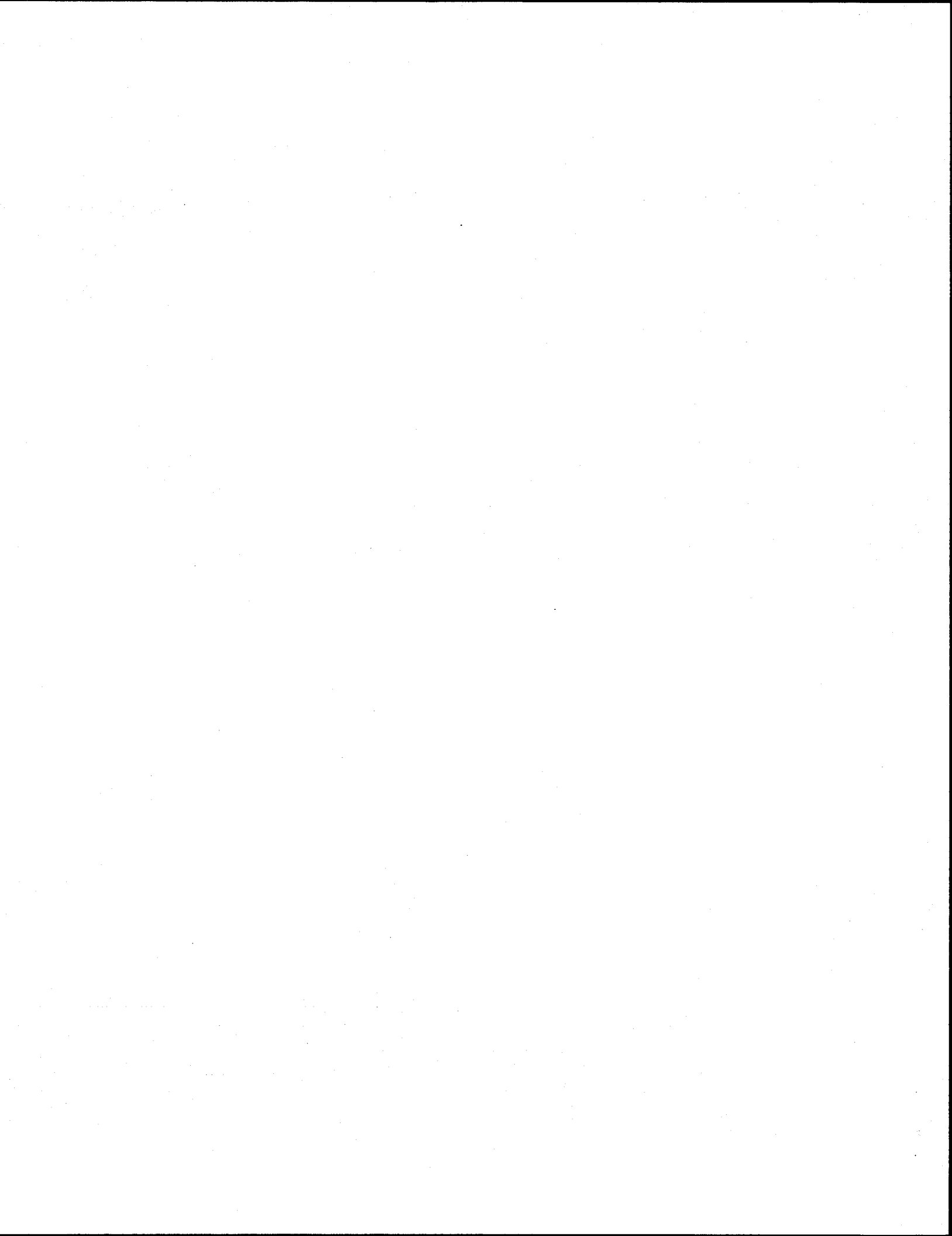
4. Manufacturer's Data

- a. Manufacturer's Equipment Information Index – Provide a complete index of all submittals related to the subject system. The index shall list the submittal's specification section, vendor, manufacturer, date of acceptance, total number of pages, and location in Part III – Product Data.
- b. Key Names and Contact Information – Provide a listing of all contractors, vendors, and manufacturers responsible for the development and installation of the subject system. Include reference information such as order numbers, customer codes, and job numbers. The following will be provided at a minimum:
 - i. Design Professionals of Record
 - ii. General Contractors
 - iii. Sub Contractors
 - iv. Material Suppliers
 - v. Equipment Vendors
 - vi. Equipment Manufacturers

C. Part III – Product Data

- 1. Record of Material and Equipment - Provide a copy of the product data and O&M manuals used in the facility construction. Include product data submittals required in Divisions 08000 through 16000 of the construction specification. Examples of product data include Manufacturer's Catalog Data and Field Test Reports. Include Shop Drawings relevant to the operation and maintenance of the facility or system. O&M manuals for equipment should be included and separately tabbed within the specification section. Do not include extraneous data, (for example, transmittal sheets, certifications, welder qualifications, contractor qualifications and certificates of compliance). Highlight or note submittals that contain information on several parts or model numbers to identify the actual installed material.
- 2. Warranties - Provide copies of manufacturer product warranties and extended warranties (beyond one year) for systems and components as listed in Specification 018100 Section 1.7. Provide one (1) binder with a copy of each warranty to Dome-Tech Commissioning Services for review. Normal warranties and extended warranties should be in separate tabbed sections of the binder.

END OF SECTION 018200



SECTION 024119

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

B. LEED BUILDING - GENERAL REQUIREMENTS:

The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Salvage of existing items to be reused or recycled.
3. Site removals associated with interface with adjacent and surrounding park landscape.

B. Related Requirements:

1. Construction waste management and disposal - section 017419
2. Sustainable design requirements (LEED building) - section 018113
3. Volatile organic compound (voc) limits for adhesives, sealants, paints and coatings - Section 018113.3
4. Construction IAQ requirements - Section 018119
5. Asbestos Abatement – Section 028213
6. Removals identified in Divisions 21-23 and 26-28.

C. Waste Management Goals

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to City of New York.
- C. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS CITY OF NEW YORKSHIP

- 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 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Bronx River Art Center (Project Site.)
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 3. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 4. Review areas where existing construction is to remain and requires protection.

1.6 REFERENCES, RESOURCES

- A. Asbestos Abatement- Section 028213
- B. DDC encourages its contractors to seek information from websites and experts in salvage or recycling in order to minimize disposal costs. There are numerous opportunities to sell salvage, or to donate salvage and accrue tax benefits (which would accrue to the contractor); also there

are outlets that will pick up, and in some cases buy recyclable materials. Examples of information resources are as follows:

1. Outlets. For assistance in finding outlets for specific materials on specific projects, one possible source is New York Wa\$teMatch. Email: wastematch@itac.org Telephone: 212-442-5219
2. DDC's Sustainable Design web site: <http://www.nyc.gov/html/ddc/html/ddcgreen> This includes a manual on Construction and Demolition Waste Reduction and Recycling, a Sample Waste Management Plan and a list of internet resources.
3. Directory of Construction and Demolition Waste Processors. A list of local recycling processors is available from New York City Department of Design and Construction, Office of Sustainable Design. DDC's consultants and contractors can request this list by contacting greeninfo@ddc.nyc.gov. This list is provided for information only and is not necessarily comprehensive; other haulers and markets are acceptable.
4. Web Resources
(Information only; no warranty or endorsement is implied.)
www.wastematch.org Site of New York Wa\$te Match, a materials exchange database and service
www.usgbc.org Site of the United States Green Building Council, with a description of the LEED certification process and requirements for C&D waste recycling
<http://www.epa.gov/epaoswer/non-hw/debris-new> Site of the U.S. Environmental Protection Agency that discusses construction and demolition waste issues, and links to other resources.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data as may be identified in Divisions 21-23 and 26-28.
- B. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, 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.
 2. Coordination for shutoff, capping, and continuation of utility services.
- D. Inventory: Submit a list of items to be removed and salvaged and deliver to City of New York prior to start of demolition.
- E. Predemolition Photographs or Video: Submit before Work begins.
- F. Statement of Refrigerant Recovery as required: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

G. LEED BUILDING Submittal Requirements:

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications.
2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
5. The LEED BUILDING Submittal information shall be assembled into one package perspecification section (or per subcontractor), and sent to the LEED Consultant for review.

1.8 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.
- B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.
- C. LEED BUILDING Submittal Requirements:

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, Sustainable Design Requirements (LEED Building) - Section 018113 of these specifications.
2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.

4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the LEED Consultant for review.

1.9 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.10 FIELD CONDITIONS

- A. Conditions existing at time of inspection for bidding purpose will be maintained by City of New York as far as practical.
 1. Before selective demolition, City of New York will remove the following items:
 - a. Furniture and Equipment unless otherwise noted on the drawings.
- B. Notify Commissioner of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- C. Hazardous Materials: Hazardous materials may be present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is included in these documents. Examine report to become aware of locations where hazardous materials may be present.
 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
- D. Storage or sale of removed items or materials on-site is not permitted.
- E. 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.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Commissioner.
- D. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
 - 1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
- E. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.
 - 1. Comply with requirements specified in Division 01 Section "Photographic Documentation."
 - 2. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.

3.2 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 specified in Division 1.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
1. Arrange to shut off indicated utilities with utility companies.
 2. Disconnect, demolish, and remove plumbing, and HVAC systems, equipment, and components indicated 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.
 - 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.
 3. Refrigerant: As required and unless otherwise noted in Divisions 21-23, remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 PREPARATION

- A. 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.
1. Comply with requirements for access and protection specified in Division 01 requirements for temporary facilities and controls.
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
1. 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.
 2. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 01.
- C. Temporary Shoring: 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.

3.4 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 within limitations of governing regulations and 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, to minimize disturbance of adjacent surfaces. 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 fire watch and portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly. Comply with requirements in Division 1 for construction waste management and disposal.

- B. Reuse of Building Elements: Project has been designed to result in end-of-Project rates for reuse of building elements as follows. Do not demolish building elements beyond what is indicated on Drawings without Commissioner's approval.

1. Building Structure and Shell: Maintain **95** percent of existing walls, floors, and roof. Maintain existing building structure (including structural floor and roof decking) and envelope (exterior skin and framing, excluding window assemblies and nonstructural roofing material) not indicated to be demolished; do not demolish such existing construction beyond indicated limits.

- C. Removed and Salvaged Items:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.

3. Store items in a secure area until delivery to City of New York.
 4. Transport items to City of New York's storage area designated by City of New York.
 5. Protect items from damage during transport and storage.
- D. 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.
- E. 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.

3.5 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.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
- D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.
- E. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. See Division 7 for new roofing requirements.
1. Remove existing roof membrane, flashings, copings, and roof accessories.
 2. Remove existing roofing system down to substrate.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain City of New York's property, remove demolished materials from Project site and legally dispose of them in accordance with local regulatory requirements, LEED submittals as part of this project and in an EPA-approved 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 requirements specified in Division 1 construction waste management and disposal.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off City of New York's property and legally dispose of them.

3.7 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.

END OF SECTION 024119

SECTION 020700

REMOVAL OF UNDERGROUND STORAGE TANKS

PART 1 - GENERAL

1.01 SCOPE OF WORK:

The Contractor shall furnish all labor, equipment, and materials required to perform all operations necessary to remove soils, dispose of tank contents, residues, contaminated soils and debris and remove and dispose of, as required by the Contract Documents or as required by the Construction Manager.

1.02 APPLICABLE REFERENCES:

The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation only and shall be the latest published versions.

1.02.1 American Petroleum Institute (API)

API Publ 1628 Assessment and Remediation of Underground petroleum Releases
API RP 2015 Cleaning Petroleum Storage Tanks
API RP 1604 Removal and Disposal of Used Underground Petroleum Storage Tanks

1.02.2 Environmental Protection Agency (EPA)

EPA 8021 1987 VOCs in Water by Purge and Trap Capillary Column Gas Chromatography with PID and Electroconductivity Detector in Series
EPA 8270 1986 SVOCs in Water by Gas Chromatography/Mass Spectrometry Using a Capillary Column

1.02.3 New York City Fire Department

FP Directive 3-73 Division of Fire Protection

1.02.4 New York State Department of Environmental Conservation (NYSDEC)

6 NYCRR Part 612 Registration of Bulk Storage Facilities
6 NYCRR Part 613 Handling and Storage of Petroleum
6 NYCRR Part 614 Standards for New and Substantially Modified Petroleum Storage Facilities
NYSDEC Memo #1 NYSDEC STARS Memo #1: Petroleum-Contaminated Soil Guidance Policy
NYSDEC Guidance Document NYSDEC SPOTS No. 14: Site Assessments at Bulk Storage Facilities

1.03 RELATED WORK:

SECTION 024119: SELECTIVE DEMOLITION

1.04 PERMIT AND LICENSE REQUIREMENTS:

Prior to the start of work under this Contract, any permits or licenses required to perform the work shall be obtained by the Contractor at the Contractor's own cost and expense. Determining license and permit requirements shall be the responsibility of the Contractor.

1.04.1 New York State Department of Environmental Conservation (NYSDEC)

- A. Storage tanks must be registered with NYSDEC. If a tank is going to be closed or its use will change, and it is not currently registered, the tank must be registered by the Contractor before proceeding. NYSDEC (Region 2) shall be notified of the intent to close the tank 30 days prior to initiation of closure activities.
- B. The Contractor shall, in addition to other requirements of these specifications, comply with the requirements of 6 NYCRR Parts 612 - 614, NYSDEC Memo #1, and NYSDEC Guidance Document.

1.04.2 New York City Fire Department (NYFD)

The Contractor shall provide an affidavit of removal of the tank or permanent closure by purging and filling with concrete, as applicable, for each facility within seven (7) days of the respective tank removal or closure. The affidavit shall be prepared in a format acceptable to the NYFD. The affidavit shall be completed by a person licensed for gasoline installation and repairs and submitted to the NYFD, Buried Tank Unit.

1.04.3 Safety Precautions

- A. Removal work shall not start until the readings from the explosion meter indicate, that a safe and non-explosive tank atmosphere has been achieved as evidenced by readings less than ten percent (10%) of the lower explosive or flammable level at all elevations within the tank. Removal work shall be progressed diligently and expeditiously without interruption until its completion. The explosion meter shall be used to take subsequent readings periodically or continuously as directed by the Construction Manager as work is progressing. If any reading indicates a dangerous level is approaching, work shall cease, the workers shall exit the tank, and additional carbon dioxide shall be introduced into the tank until safe conditions are restored to all levels within the tank.
- B. The Contractor shall permit only trained and properly equipped personnel to enter the tank. Tanks shall not be entered unless personnel have and use proper self contained breathing apparatus and standby personnel similarly equipped are present at the site to safeguard and protect those working in the tank. Workers in the tank shall also have and use appropriate harnesses and lifelines connected to personnel retrieval equipment fully rigged, and ready for use.

1.05 PROTECTION OF EXISTING STRUCTURES AND UTILITIES:

All necessary precautions shall be taken to assure that no damage occurs to existing structures and appurtenances and utilities to remain in place. Any buried utilities encountered which are not shown on the Contract Drawings marked out by the Contractor, or otherwise indicated, shall be reported immediately to the Construction Manager and shall not be disturbed without prior approval of the Construction Manager.

1.06 SPILL PREVENTION:

Any releases to the environment of tank contents or cleaning liquids shall be remediated by the Contractor as approved by the Construction Manager at no cost to the City. Spill prevention measures shall be fully described in the Spill Prevention and Control Plan as specified in Section: SPILL PREVENTION AND CONTROL.

1.07 DIGGING PERMITS AND ROAD AND/OR PARKING LOT CLOSINGS:

The Contractor shall obtain all necessary base excavation (digging and road/parking for closing) permits from the NYC Public Works Department before starting any excavation work on this project. The Contractor shall allow fourteen (14) calendar days from date of written application to receive permission to dig and to partially close roads and/or parking lots.

1.08 REMOVED MATERIAL:

Except as otherwise set forth in these Specifications or as limited by the Construction Manager, all removed materials shall become the property of the Contractor who shall promptly remove them from the work site and dispose of the same in accordance with Part 3 of this Section. Storage of removed material within the work site will not be permitted.

1.09 SUBMITTALS:

- A. Plan of Operations. A Plan of Operations shall be prepared and submitted to the Construction Manager for approval within fifteen (15) days after the date of Notice to Proceed. The plan shall describe methods, equipment, and sequences of operations, including, but not limited to:
1. Tank contents removal;
 2. Spill prevention;
 3. Exploratory excavations;
 4. Tank purging procedure;
 5. Interior and exterior tank cleaning procedure;
 6. Wastewater collection and disposal;
 7. Facility to perform analyses;
 8. Permanent closure of underground storage tank; and
 9. Anticipated use, recycling or disposal of contents; and
 10. Soil/Groundwater Sampling procedure
 11. Backfilling compaction and grading

- 12. Disposal of petroleum storage tanks
- 13. Safety and health plan

Work shall not be started until the plan has been approved by the Construction Manager.

- B. Chemical Data Acquisition Plan: A Chemical Data Acquisition Plan (CDAP) for sampling of soil and groundwater to be disposed of off-site shall be provided to the Construction Manager and the NYSDEC prior to the start of work.
- C. Results of Testing: Documentation of the soil and groundwater disposal sampling performed, including analytical results, shall be provided to the Construction Manager and to the NYSDEC.
- D. Waste Manifests. Copies of manifests required to transport any waste materials shall be furnished to the Construction Manager not later than the day following their preparation.
- E. Documentation of Treatment or Disposal. Documentation of acceptance of waste materials by a facility legally permitted to treat or dispose of those materials shall be furnished to the Construction Manager not later than seven (7) days following delivery of those materials to the facility.
- F. Letters of acceptance from the facility and haulers acknowledging agreement to accept the waste material shall be furnished to the Construction Manager not more than fourteen (14) days before transporting any hazardous or toxic materials.

1.10 TANK DESCRIPTIONS:

- A. Locations: General locations of all tanks are shown on the Contract Drawings. Specific locations of tanks shall be defined by exploratory excavations performed by the Contractor. The cost of exploratory investigations shall be borne by the Contractor.
- B. Tank Contents: Tanks have been used for storage of petroleum products.

PART 2 - PRODUCT

(Not Used)

PART 3 - EXECUTION

3.01 TANK CONTENTS REMOVAL AND DISPOSAL:

- 3.01.1 Salvageable petroleum products. All salvageable petroleum products shall be transferred by the Contractor to other tanks as approved by the Construction Manager within the five boroughs of NYC at no cost to the City. If storage capacity is not available, then

salvageable oil and/or fuel becomes the property of the Contractor for beneficial use or disposal at no additional expense to the City.

- 3.01.2 Sludge Material (Temporary Storage). Sludge shall be collected in new or reconditioned 55-gallon drums or roll-off containers. Drums or containers shall be sealed water-tight to prevent rain infiltration and leaking of sludge and stored on-site in such a manner that the contents will not spill or leak. Chemical sampling and analyses of sludge shall be conducted and paid for by the Contractor in accordance with environmental regulatory requirements, as approved by the Construction Manager. Analytical results shall be provided to the Construction Manager as soon as possible after receipt of results. Drums or containers shall be labeled in accordance with Federal and State Regulations.
- 3.01.3 Contaminated Water. Contaminated water shall be collected in new or reconditioned 55-gallon drums or roll-off containers. Drums or containers shall be sealed water-tight to prevent infiltration and leaking of water. Drums or containers shall be stored on-site in such a manner that the contents will not spill or leak. Chemical sampling and analysis of the waste shall be conducted and paid for by the Contractor in accordance with environmental regulatory requirements, as approved by the Construction Manager. Analytical results shall be provided to the Construction Manager within five (5) working days after receipt of results. Drums or containers shall be labeled in accordance with federal and State Regulations. All tanks shall be pumped completely dry before being removed. All water shall be transported and disposed of in accordance with applicable laws. All product shall be disposed of according to applicable laws. During the emptying operation the following restrictions shall apply:
- A. Smoking shall be banned in the area
 - B. All open flame and spark producing equipment within the area shall be shut down
 - C. All electrical and internal combustion equipment not marked AExplosion Proof@shall be removed
 - D. Only Anon-sparking@ tools shall be used
 - E. Static electricity shall be controlled
 - F. The work area shall be secured
- 3.01.4 Disposal. Sludge shall not be on-site for more than 90 days. Information and documentation requirements including any required sampling for transport, salvage, treatment or disposal shall be determined and provided by the Contractor. Sludge shall be disposed of in accordance with environmental regulatory requirements at no additional cost to the City.
- 3.02 CLEANING OF TANK:**
- A. The Contractor shall provide an explosion meter to monitor the tank atmosphere before, during and after the cleaning and purging procedures.

- B. All tanks shall be cleaned prior to disposal of all residue and product clinging to their surfaces. The tank storage systems, including all tanks and piping, shall be purged of flammable vapors. Storage tanks shall be cleaned in accordance with API RP 2015. Steam shall not be used for either purging or cleaning a tank or other equipment. An affidavit of such purging, signed by the Contractor=s licensed UST system installer, shall be filed by the Contractor with the Commissioner of the NYFD, Division of Fire Prevention.
- C. The Contractor shall comply with all OSHA requirements and regulations. All product cleaning solvent and water generated by the operation, shall be transported by a transporter permitted under 6 NYCRR 364 and, if disposed of in NYS, disposed of at a site regulated by the NYSDEC.

3.03 REMOVAL OF UNDERGROUND STORAGE TANKS:

- 3.03.1 Access to the interior of the tanks shall be made through existing manholes. If the tanks do not have manholes, the Contractor shall excavate and provide an opening into the tank after purging.
- 3.03.2 The procedures for removing the tanks shall include, but not be limited to the following:
 - A. Remove all product that can be pumped out.
 - B. Drain and flush piping into the tanks.
 - C. Remove remaining liquid from the tanks.
 - D. All piping and gauge lines, with the exception of the vent lines, shall be disconnected and capped.
 - E. The tank storage systems, including all tanks and piping, shall be purged of flammable vapors as described in Section 3.02 above.
 - F. The interior of the tanks shall be cleaned with a high pressure rinse.
 - G. The tanks shall be removed and disposed of in accordance with API RP 1604.
 - H. The vent lines shall be capped at the tanks and all exposed piping removed and disposed of as approved by the Construction Manager.

3.04 DISPOSAL OF EXCAVATED SOIL:

The Contractor shall assume all excavated soil as petroleum contaminated. Soil must be disposed of in accordance with applicable NYC, State and Federal regulations. The Contractor shall dispose of all petroleum contaminated soil at a facility which is permitted by the NYSDEC to accept such materials. The Contractor shall secure all permits required in connection thereof and provide the Construction Manager with all documentation regarding the disposal of such soil.

3.05 DISPOSAL OF PETROLEUM STORAGE TANKS:

All storage tanks containing petroleum liquids shall be removed in accordance with the requirements of NYC fire and police officials and those of the NYSDEC in general and 6

NYCRR part 613 in particular. All nonmetal tanks shall be disposed of (or recycled) at facilities permitted by the NYSDEC. Metal tanks shall be disposed of only by recycling.

3.06 EXCAVATION BACKFILL:

All backfill shall be clean and in accordance with Section: EXCAVATION, TRENCHING, AND BACKFILLING FOR UTILITIES SYSTEM.

3.07 SITE ASSESSMENT:

- A. General: The Construction Manager shall perform a site assessment to determine if there is any contamination present at the site. The Contractor shall assist with the site assessment as directed by the Construction Manager. The Contractor shall notify the Construction Manager at least 5 days prior to the day the Construction Manager is expected to be on-site for sampling operations. Any costs incurred due to delays caused by the Contractor's failure to provide a minimum of five days notice to the Construction Manager will be at the Contractor's expense.
- B. Equipment: The Construction Manager will conduct drilling/sampling operations. The Contractor shall assist with the site assessment as directed by the Construction Manager.
- C. Sampling Procedure for Tanks Removed: The Construction Manager will conduct sampling operations. In general, a minimum of five soil samples will be collected around each tank that is to be removed. Soil samples shall be taken from any area that appears to be visually contaminated. If there are no areas of visually contaminated soil then one sample from each side-wall of the excavation, two samples from the bottom of the excavation and two samples from a depth of 2 or 3 ft. below the bottom of the excavation will be collected. If groundwater is within 5 ft. of the bottom of the excavation, then a groundwater sample shall be taken. All samples collected for vapor contamination shall be screened using a PID or other approved instrument. The samples showing the highest vapor contamination shall be sent to the lab for analysis. If the PID does not indicate a relative difference in soil conditions across the site then one sample from each side wall and two samples from a depth of 2 to 3 ft. beneath the tank excavation shall be sent for lab analysis. Sample collection and lab analysis shall be conducted in accordance with subparagraph 3.07.4 and 3.07.5, respectively.
- D. Sample Collection. Sample collection shall be conducted in accordance with API Publication 1628.
- E. Lab Analysis: Samples collected for analysis shall be sent to the Construction Manager's independent testing lab. For tanks containing gasoline, samples shall be analyzed using EPA Test Method 8021 plus methyl tert butyl ether (MTBE). For tanks containing diesel fuel, samples shall be analyzed for VOCs using EPA Method 8021 and SVOCs using EPA Method 8270.

3.08 TANK CLOSURE REPORT:

The Construction Manager shall prepare a Tank Closure Report for each UST site. The Contractor shall assist the Construction Manager with preparation of the Tank Closure Reports as directed by the Construction Manager. In addition, the Contractor shall assist the Construction Manager in obtaining information for inclusion in the Tank Closure Reports as directed by the Construction Manager. Tank Closure Reports shall include the following information as a minimum:

- A. A cover letter signed by the Contractor's responsible company official certifying that all services involved have been performed in accordance with the terms and conditions of this Specification.
- B. A narrative report describing what was encountered at each site, including:
 - 1. Condition of the UST
 - 2. Any visible evidence of leaks or stained soils
 - 3. Results of vapor monitoring readings
 - 4. Actions taken including quantities of material treated or removed
 - 5. Reasons for selecting sample locations
 - 6. Sample locations, depths, and collection methods
 - 7. Sample collection data such as time of collection and method of preservation
 - 8. Whether or not groundwater was encountered
 - 9. Summary tables showing comparison of sample results to both NYSDEC STARS Memo #1 and NYSDEC TAGM #4046 requirements
- C. Copies of all analyses performed for disposal.
- D. Copies of all waste analyses or waste profile sheets.
- E. Copies of all certification of final disposal signed by the responsible disposal facility official.
- F. Information on who sampled, analyzed, transported, and accepted all waste encountered and copies of manifests.
- G. Copies of all analysis performed for verification that underlying soil is not contaminated, with copies of chain-of-custody for each sample. All analyses shall give the identification number of the sample analyzed.
- H. Scaled one-line drawings showing tank locations, limits of excavation, limits of contamination, underground utilities within 50 ft., sample locations, and sample identification numbers.
- I. Progress Photographs: The Construction Manager shall take a minimum of four views of the site showing such things as the location of each tank, entrance/exit road, and any other notable site condition before work begins. After work has been started at the site, the Construction Manager shall photographically record activities at each work location daily. Photographs shall be 3-in. x 5-in. and shall include:
 - 1. Soil removal, handling and sampling

2. Unanticipated events such as discovery of additional contaminated areas
 3. Soil stockpile area
 4. Tank
 5. Fill placement and grading
- J. Post-construction photographs. After completion of work at each site, the Construction Manager shall take a minimum of four views of the site. Prints shall illustrate the condition and location of work and the state of progress. The photographs shall be mounted and enclosed back-to-back in a double face plastic sleeve punched to fit standard three ring binders. Each color print shall show an information box, 12-in. x 32-in. The information box for the 3-in. x 5-in. photographs shall be scaled down accordingly, or taped to the bottom of the photo. The box shall be typewritten and arranged as follows:

Project No.:	Contract No.:
Location:	
Contractor:	
Photographer:	
Photograph No.:	Date/Time:
Description:	
Direction of View:	

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 028013 – GENERAL CONTRACTOR WORK
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 (cummingtonite-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 Asbestos abatement 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 Asbestos abatement contractor is responsible to retain a NYSDOL Licensed 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 than 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 demonstrate compliance with the special experience requirements set forth in subparagraphs (1) through (5) below. The asbestos abatement contractor must, submit documentation demonstrating compliance with all listed requirements. 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, must demonstrate for the three year period prior to the work, that it has been licensed by the New York State Department of Labor, as an "Asbestos abatement contractor".
 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 provide evidence of having successfully performed and completed in a timely fashion at least five (5) asbestos abatement projects of similar size and complexity. The aggregate cost of these projects must be at least \$250,000.00 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 of the owner or the owner's representative who is familiar with the asbestos abatement contractor's work, brief description of the 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, 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.

- B. Insurance Requirements: The asbestos abatement contractor must provide asbestos liability insurance in the following amount: 1 million dollars per occurrence, 2 million dollars aggregate (combined single limit). The City of New York shall be named as an additional insured on such insurance policy.
- C. 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.

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.

GENERAL CONTRACTOR WORK ALLOWANCE FOR INCIDENTAL ASBESTOS ABATEMENT

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"	14"	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 1.09, multiplied by the unit price in Section 1.05.

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. Material Safety Data Sheets (MSDS) 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 MSDS 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 log book of minimum 8-1/2" x 11" size at the entrance to the Worker and Waste Decontamination enclosure system as hereinafter specified. Log book 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. Log book 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.

GENERAL CONTRACTOR WORK ALLOWANCE FOR INCIDENTAL ASBESTOS ABATEMENT

- 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

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 028213

ASBESTOS ABATEMENT

PART 1 – GENERAL

1.01 DESCRIPTION

- A. The Contract Documents are as defined in the “Agreement”. The General Conditions shall apply to all Work of this Section.
- B. Work specified herein shall be the removal and disposal of Asbestos-Containing Materials (ACM) and asbestos-contaminated materials from designated areas of the Bronx River Art Center, located at 1087 East Tremont Avenue, New York, 10460.
- C. The following documents were reviewed and utilized to generate this abatement design specification which serves to locate and quantify the amount of ACM, and asbestos contaminated material, to be abated in support of this project.
 - 1. Scope of Work titled “Bronx River Art Center Building Reconstruction”, dated 10/28/09 prepared by Sage and Coombe Architects;
 - 2. Set of drawings titled “Bronx River Art Center Building Reconstruction” (75% Final Design Drawings), dated 10/28/09, prepared by Sage and Coombe Architects;
 - 3. Final Report of Asbestos Survey Services performed by Louis Berger and Associates, PC, May 20, 2008;
 - 4. Supplemental Asbestos Survey performed by Weston Solutions. Inc., February 19, 2010.
- D. The phasing and scheduling of work for this project shall be coordinated with and approved by the Construction Project Manager and Facility Manager. The Construction Project Manager and Facility Manager will make the final determination on all issues under this Contract covered by this Specification.

1.02 SCOPE OF WORK

- A. The asbestos abatement contractor is to provide all labor, materials, equipment, services, testing, appurtenances, permits and agreements necessary to perform the work required for the abatement of ACM as required by these contract documents. All work shall be performed in accordance with this Specification, EPA regulations, OSHA regulations, New York City Local Law 70, Title 15, Chapter 1 RCNY, New York State Industrial Code 56, NIOSH recommendations, and any other applicable federal, state or local government regulations. Whenever there is a conflict or overlap of the above references, the most stringent provisions are applicable.

ASBESTOS ABATEMENT

B. The intent of this Specification section is to ensure that the asbestos abatement contractor is responsible for the following:

1. Abatement of all ACM.
2. Cleaning and decontamination of the entire affected area.
3. Demolition that may be required to access ACM in each area, Asbestos abatement contractor shall dispose of all debris associated with demolition activities as ACM waste.
4. Removal and disposal of all ACM found within these areas such as duct vibration cloth, roof membrane, roof flashing material, etc.
5. Provide all scaffolding, platform installation, equipment, tools, transportation and any other equipment required and/or necessary to complete all work described in the Contract Documents.
6. The Asbestos abatement contractor shall be responsible for and shall include any and all fees or changes imposed by Local, State or Federal Law, Rule or Regulation applicable to the work specified herein, including fees or charges which may be imposed subsequent to the work.
7. Prior to destructive demolition activities, the DDC may elect to collect bulk samples of assumed asbestos-containing materials and analyze the bulk samples for asbestos content.

C. The Asbestos abatement contractor shall perform the following work as described below and indicated on the drawings. The drawings are only a diagrammatic representation of the Work Areas and do not constitute the actual quantities of material. Asbestos abatement contractor is responsible for the confirmation of the actual total quantities of the Work.

1. Drawing H-002: First Floor Plan

- a. Remove and dispose of asbestos containing wall plaster (white and brown coats) within **Work Area 1**. Work Area 1 shall be removed utilizing NYCDEP Title 15, Chapter 1, Subchapter F, "Attachment WP/WC – Removal of ACM Wall Plaster or ACM Ceiling Plaster plus ACM Wall Plaster."
- b. Remove and dispose of pipe insulation in **Work Area 2** utilizing tent procedures as specified in NYCDEP Title 15, Chapter 1, § 1-105 Glovebag Procedure.

ASBESTOS ABATEMENT

Work Area	Removal Procedure	Approximate Square Feet (Sq. Ft.)	Approximate Linear Feet (Ln. Ft.)
1	NYCDEP Full Containment (Attachment WP/WC)	5,800 Sq. Ft. Wall Plaster (White and Brown Coats)	—
2	NYCDEP Section § 1-105 Glovebag Procedure	-	10 Ln. Ft. Pipe Insulation

2. Drawing H-003: Second Floor Plan

- a. Remove and dispose of asbestos-containing 9"x 9" brown floor tile within **Work Area 3** utilizing NYC-DEP Title 15, Chapter 1, Subsection 108 "Foam/Viscous Liquid Use in Flooring Removal." In areas where VAT is to be removed, the contractor shall be responsible to remove all layers of floor tile and associated mastic to the substrate surface. Multiple layers of floor tile will not be cause for additional compensation to the contractor. All layers of VAT and its associated mastics as well as any plywood and/ or particle board in-between layers shall be disposed of as asbestos contaminated waste.

Work Area	Removal Procedure	Approximate Square Feet (Sq. Ft.)	Approximate Linear Feet (Ln. Ft.)
3	NYCDEP Section § 1-108 Foam/Viscous Liquid Use in Flooring Removal	65 Sq. Ft. of 9" x 9" Brown Floor Tile	—

3. Drawing H-004: Roof Plan

- a. Remove and dispose of asbestos-containing roofing materials (including pipe vent flashing and tar on old coping stone) within **Work Area 4**. Asbestos-containing roofing material (including roof membrane and roof flashing) shall be removed utilizing NYCDEP Title 15, Chapter 1 § 1-107 Foam Procedure for Roof Removal. The Contractor shall be responsible for the removal and disposal of all roofing components, including but not limited to roof membrane and roof flashing down to the substrate/deck.

ASBESTOS ABATEMENT

Work Area	Removal Procedure	Approximate Square Feet (Sq. Ft.)	Approximate Linear Feet (Ln. Ft.)
4	NYCDEP Section § 1-107 Foam Procedure for Roof Removal	8 Sq. Ft. of Pipe Vent Flashing	—
		50 Sq. Ft. of Tar on Old Terracotta Coping Stone	-

4. Drawing H-005: East Elevation Plan

- a. Remove and dispose of asbestos-containing exterior window frame caulking within **Work Area 5**. Exterior caulking shall be removed utilizing NYCDEP Title 15, Chapter 1 § 1-109 Abatement from Vertical Exterior Surfaces.

Work Area	Removal Procedure	Approximate Square Feet (Sq. Ft.)	Approximate Linear Feet (Ln. Ft.)
5	NYCDEP Section § 1-109 Abatement from Vertical Exterior Surfaces	58 Openings (48 Sq. Ft. or 950 Ln. Ft.) of Exterior Window Frame Caulking	58 Openings (48 Sq. Ft. or 950 Ln. Ft.) of Exterior Window Frame Caulking

5. Drawing H-006: North Elevation Plan

- a. Remove and dispose of asbestos-containing exterior window frame caulking within **Work Area 5**. Exterior caulking shall be removed utilizing NYCDEP Title 15, Chapter 1 § 1-109 Abatement from Vertical Exterior Surfaces.

Work Area	Removal Procedure	Approximate Square Feet (Sq. Ft.)	Approximate Linear Feet (Ln. Ft.)
5	NYCDEP Section § 1-109 Abatement from Vertical Exterior Surfaces	58 Openings (48 Sq. Ft. or 950 Ln. Ft.) of Exterior Window Frame Caulking	58 Openings (48 Sq. Ft. or 950 Ln. Ft.) of Exterior Window Frame Caulking

6. Drawing H-007: South Elevation Plan

- a. Remove and dispose of asbestos-containing exterior window frame caulking within **Work Area 5**. Exterior caulking shall be removed utilizing NYCDEP Title 15, Chapter 1 § 1-109 Abatement from Vertical Exterior Surfaces.

ASBESTOS ABATEMENT

Work Area	Removal Procedure	Approximate Square Feet (Sq. Ft.)	Approximate Linear Feet (Ln. Ft.)
5	NYCDEP Section § 1-109 Abatement from Vertical Exterior Surfaces	58 Openings (48 Sq. Ft. or 950 Ln. Ft.) of Exterior Window Frame Caulking	58 Openings (48 Sq. Ft. or 950 Ln. Ft.) of Exterior Window Frame Caulking

7. Drawing H-008: West Elevation Plan

- i. Remove and dispose of asbestos-containing exterior window frame caulking within **Work Area 5**. Exterior caulking shall be removed utilizing NYCDEP Title 15, Chapter 1 § 1-109 Abatement from Vertical Exterior Surfaces.

Work Area	Removal Procedure	Approximate Square Feet (Sq. Ft.)	Approximate Linear Feet (Ln. Ft.)
5	NYCDEP Section § 1-109 Abatement from Vertical Exterior Surfaces	58 Openings (48 Sq. Ft. or 950 Ln. Ft.) of Exterior Window Frame Caulking	58 Openings (48 Sq. Ft. or 950 Ln. Ft.) of Exterior Window Frame Caulking

- D. The facility is under the jurisdiction of the New York City Department of Cultural Affairs. The asbestos abatement contractor shall perform the work of this contract in a manner that will be least disruptive to the normal use of the building.
- E. Asbestos abatement contractor's attention is directed to the fact that patents cover certain methods of asbestos abatement indicated in the specifications. To date, patents have been issued with regard to negative pressure enclosures or negative or reduced pressure and glove-bag.
- F. Asbestos abatement contractor shall be solely responsible for and shall hold the City of New York Department of Design and Construction and the City harmless from, any and all damages, losses and expenses resulting from any infringement by Asbestos abatement contractor of any patent, including but not limited to the patents described above, used by Asbestos abatement contractor during performance of this agreement.
- G. Prior to starting, the asbestos abatement contractor must notify the Commissioner of the City of New York Department of Design and Construction if he anticipates any difficulty in performing the work as directed and required by these Specifications. Asbestos abatement contractor shall be required to attend an on-site job meeting with the Construction Project Manager prior to start of work to

ASBESTOS ABATEMENT

examine conditions of the site for removal and plan the sequence for removal operations.

- H. The asbestos abatement contractor shall retain a certified Project Designer for the preparation of an Asbestos Variance Application (ACP-9), if required.
- I. The asbestos abatement contractor shall be responsible for preparing and submitting all filings, notifications, amendments and variances, etc. required by all City, State and Federal regulatory agencies having jurisdiction, at no additional cost to the NYC DDC.
- J. The asbestos abatement contractor shall retain a Registered Design Professional (person licensed and registered to practice the professions of architecture or engineering under the Education Law of the State of New York) to prepare a Work Place Safety Plan (WPSP), if required.
- K. The asbestos abatement contractor shall retain a Registered Design Professional (person licensed and registered to practice the professions of architecture or engineering under the Education Law of the State of New York) to perform final inspections required pursuant to Title 28 of the Administrative Code, including but not limited to special inspections required under Chapter 17 of the Building Code. Such special inspections and A-TR1 forms shall be completed by the Registered Design professional.
- L. For coordination with other Asbestos abatement contractors, see the General Conditions governing all Contracts.
- M. Related Asbestos Removal Work Under Other Contracts:
 - 1. Each asbestos abatement contractor shall be responsible for the removal of incidental asbestos not identified in this section and found prior to or during the Work.
 - 2. Incidental asbestos is defined as ACM that is discovered during the course of their work that must be abated to enable them to perform the work of their Contract.
- N. Work Hours:
 - 1. The asbestos abatement contractor shall establish his work schedule in a way that avoids interference or conflict with the normal functioning of the facility. Work in the evenings shall be done at no additional cost to the City.
 - 2. All work shall be done during regular working hours unless the Asbestos abatement contractor requests authorization to work other than regular working hours and such authorization is granted by the Commissioner (Regular working hours are those during which any given facility in which work is to be done is customarily open and functioning). If such work

ASBESTOS ABATEMENT

schedule is authorized by the Commissioner the work shall be done at no additional cost to the City.

3. The order of phases and start dates associated with each will be determined by the Construction Project Manager.
 4. Asbestos abatement contractor shall be required to schedule waste transfer during evening hours, when activity within the facility is at a minimum. Evening hours are defined as 6:00 p.m. to 6:00 a.m. Waste transfer must be approved by the Construction Project Manager and Facility Manager.
- O. The following conditions shall apply to all temporary shutdowns of existing services:
1. All temporary lighting and temporary electrical services for use in the Work Area shall be in weather proof enclosures and be ground fault protected and:
 2. Shall be performed at no additional charge to the City.
 3. Shall be performed at times not interfering with the other activities in the building.
 4. Shall be performed only with written consent from the Commissioner and the Facility Manager.
 5. Shall be made through written request to the Commissioner at least 10 days in advance with complete written description of the work to be performed.
- P. Stages of Asbestos Removal Work:
- a. The asbestos abatement contractor will be required to perform the work and it is the intent of this Specification to remove all asbestos containing and asbestos contaminated materials from the Work Area. The asbestos abatement contractor is responsible for verifying all quantities of materials listed.
- Q. Certain equipment in the Work Area may need to remain operational during removal. Therefore, the removal of ACM from this equipment shall be performed as the last removal activities within the Work Area. The Asbestos abatement contractor shall coordinate the scheduling for the removal of ACM on functioning equipment with the Construction Project Manager.

1.03 QUALIFICATIONS OF ASBESTOS ABATEMENT CONTRACTOR

- A. Requirements: The asbestos abatement contractor must demonstrate compliance with the special experience requirements set forth in subparagraphs (1) through (5) below. The asbestos abatement contractor must submit documentation demonstrating compliance with all listed requirements. 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, as an "Asbestos Abatement Contractor".
 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 provide evidence of having successfully performed and completed in a timely fashion at least 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 of the owner or the owner's representative who is familiar with the asbestos abatement contractor's work; brief description of the 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, 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.
- 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.

ASBESTOS ABATEMENT

- 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. 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.

1.04 WORK BY OTHERS

The City reserves the right during the term of this Contract to have work performed on asbestos abatement projects by other asbestos abatement contractors as the situation warrants.

1.05 DEFINITIONS

- A. General Explanation: Certain terms used in this Specification Section are defined below. Definitions and explanations of this Specification Section are not necessarily complete or exclusive, but are general for the Work to the extent they are not stated more explicitly in another element of the Contract Documents.
- B. Definitions in General Use:
1. Approve: Where used in conjunction with Engineer's response to submittals, requests, applications, inquiries, reports and claims by Asbestos abatement contractor, the meaning of term "approved" will be held to limitations of Engineer's responsibilities and duties as specified in Contract Documents. In no case will "approval" by Engineer be interpreted as a release of Asbestos abatement contractor from responsibilities to fulfill requirements of Contract Documents.
 2. Directed, Requested, etc.: Where not otherwise explained, terms such as "directed," "requested," "authorized," "selected," "approved," "required," "accepted," and "permitted" mean "directed by Engineer," "requested by Engineer," and similar phrases. However, no such implied meaning will be interpreted to extend Engineer's responsibility into Asbestos abatement contractor's responsibility for construction supervision.

ASBESTOS ABATEMENT

3. **Furnish:** Except as otherwise defined in greater detail, term "furnish" is used to mean supply and deliver to project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.
4. **Indicated:** The term "indicated" is a cross-reference to graphic representations, notes or schedules on Drawings, to other paragraphs or schedules in the Specifications, and to similar means of recording requirements in Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used in lieu of "indicated," it is for purpose of helping reader locate cross-reference, and no limitation of location is intended except as specifically noted.
5. **Install:** Except as otherwise defined in greater detail, term "install" is used to describe operations at Project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning and similar operations, as applicable in each instance.
6. **Installer:** The term "installer" is defined as the entity (person or firm) engaged by the asbestos abatement contractor, or its sub-asbestos abatement contractor for performance of a particular unit of work at Project site, including installation, erection, application and similar required operations. It is a general requirement that such entities (installers) be expert in operations they are engaged to perform.
7. **Provide:** Except as otherwise defined in greater detail, term "provide" means furnish and install, complete and ready for intended use, as applicable in each instance.
8. **Third-Party Air Monitor:** The term "Third-Party Air Monitor" is defined as an entity engaged by City and Construction Project Manager to perform specific inspections or tests of the work, either at Project site or elsewhere; and to report and (if required) interpret results of those inspections or tests.

C. Definitions Relative to Asbestos Abatement:

1. **Abatement:** Any and all procedures physically taken to control fiber release from asbestos-containing materials. This includes removal, encapsulation, enclosure, cleanup and repair.
2. **Adequately Wet:** The complete penetration of a material with amended water to prevent the release of particulates. If visible emissions are observed coming from asbestos-containing material, then the material has not been adequately wetted. However, the absence of visible emissions is not evidence of being adequately wet. ACM must be fully penetrated with the wetting agent in order to be considered adequately wet. If the ACM being abated is resistant to amended water penetration, wetting agent shall be

ASBESTOS ABATEMENT

applied to the material prior to and during removal as necessary to minimize fiber release.

3. Aggressive Sampling: Method of sampling in which the individual collecting the air sample creates activity by the use of mechanical equipment during the sampling period to stir up settled dust and simulate activity in that area of the building.
4. AHERA: Asbestos Hazard Emergency Response Act of 1986
5. AIHA: American Industrial Hygiene Association.
6. Airlock: System for permitting entrance and exit while restricting air movement between a contaminated area and an uncontaminated area. It consists of two curtained doorways separated by a distance of at least three feet such that one passes through one doorway into the airlock, allowing the doorway sheeting to overlap and close off the opening before proceeding through the second doorway, thereby preventing flow-through contamination.
7. Air Sampling: Process of measuring the fiber content of a known volume of air collected during a specific period. The procedure utilized for asbestos follows the NIOSH Standard Analytical Method 7400, or the provisional transmission electron microscopy methods developed by the US EPA which is utilized for lower detection levels and specific fiber identification.
8. Ambient Air Monitoring: "Ambient air monitoring" shall mean measurement or determination of airborne asbestos fiber concentrations outside but in the general vicinity of the worksite.
9. Amended Water: Water to which a surfactant has been added.
10. ANSI: American National Standards Institute
11. Area Air Sampling: Any form of air sampling or monitoring where the sampling device is placed at some stationary location.
12. Asbestos: Any hydrated mineral silicate separable into commercially usable fibers, including but not limited to chrysotile (serpentine), amosite (cumingtonite-grunerite), crocidolite (riebeckite), tremolite, anthophyllite and actinolite.
13. Asbestos-Containing Material (ACM): Asbestos or any material containing more than one-percent asbestos.
14. Asbestos-Containing Waste Material: ACM, asbestos-contaminated objects or debris associated with asbestos abatement requiring disposal.

ASBESTOS ABATEMENT

15. Asbestos-Contaminated Objects: Any objects which have been contaminated by asbestos or asbestos-containing material.
16. Asbestos Assessment Report: "Asbestos Assessment Report" shall mean the "Form ACP-5" form, as approved by NYCDEP, by which a NYCDEP-certified asbestos investigator certifies that a building or structure (or portion thereof) is free of ACM or the amount of ACM to be abated constitutes a minor project.
17. Asbestos Handler: Individual who disturbs, removes, repairs, or encloses asbestos material. This individual shall have completed approved training course(s) and be in possession of certification issued by NYCDEP and NYSDOL.
18. Asbestos Handler Supervisor: Individual who supervises the handlers during an asbestos project and ensures that proper asbestos abatement procedures as well as individual safety procedures are being adhered to. This individual shall have completed approved training course(s) and be in possession of certification issued by NYCDEP and NYSDOL.
19. Asbestos Investigator: An individual certified by NYCDEP as having successfully demonstrated his or her ability to identify the presence of and evaluate the condition of asbestos in a building or structure.
20. Asbestos Project: Any form of work performed in a building or structure which will disturb (e.g., remove, enclose, encapsulate) more than 25 linear feet or more than 10 square feet of asbestos-containing material.
21. ASTM: American Society for Testing and Materials.
22. Asbestos Project Notification: The "Form ACP-7" asbestos project notification form as approved by DEP.
23. Authorized Visitor: Authorized visitor shall mean the building owner and his/her representative, and any representative of a regulatory or other agency having jurisdiction over the project.
24. Building Owner: Person in whom legal title to the premises is vested unless the premises are held in land trust, in which instance Building Owner means the person in whom beneficial title is vested.
25. Building Materials: Any and all manmade materials, including but not limited to interior and exterior finishes, equipment, bricks, mortar, concrete, plaster, roofing, flooring, caulking, sealants, tiles, insulation, and outdoor paving such as sidewalks, paving tiles and asphalt.

ASBESTOS ABATEMENT

26. Certified Industrial Hygienist (CIH): Individual with a minimum of five years experience as an industrial hygienist and who has successfully completed both levels of the examination administered by the American Board of Industrial Hygiene and who is currently certified by that board.
27. Certified Safety Professional (CSP): Individual having a bachelor's degree from an accredited college or university and a minimum of four years experience as a safety professional and who has successfully completed both levels of the examination administered by the Board of Certified Safety Professionals and who is currently certified by that board.
28. Chain of Custody: "Chain of Custody" shall mean the form or set of forms that document the collection and transfer of a sample.
29. City: City of New York
30. Clean Room: An uncontaminated area or room that is part of worker decontamination enclosure system with provisions for storage of workers' street clothes and protective equipment.
31. Clearance Air Monitoring: Employment of aggressive sampling techniques with a volume of air collected to determine the airborne concentration of residual fibers and shall be performed as the final abatement activity.
32. Commissioner: shall mean the head of the Agency that has entered into this contract or his/her duly authorized representative.
33. Competent Person: Shall mean the designated person as defined by OSHA in 29 CFR1926.1101.
34. Curtained Doorway: Device that consists of at least three overlapping sheets of fire retardant plastic over an existing or temporarily framed doorway. One sheet shall be secured at the top and left side, the second sheet at the top and right side, and the third sheet at the top and left side. All sheets shall have weights attached to the bottom to ensure that the sheets hang straight and maintain a seal over the doorway when not in use.
35. Decontamination Enclosure System: Series of connected rooms, separated from the Work Area and from each other by air locks, for the decontamination of workers, materials, waste containers, and equipment.
36. Demolition: The dismantling or razing of a building, including all operations incidental thereto (except for asbestos abatement activities), for which a demolition permit from the New York City Department of Buildings is required.

ASBESTOS ABATEMENT

37. NYCDEP or DEP: The New York City Department of Environmental Protection.
38. Disturb: Any action taken which may alter, change, or stir, such as but not limited to the removal, encapsulation, enclosure or repair of asbestos-containing material.
39. DOB: The New York City Department of Buildings.
40. Egress: A continuous and unobstructed path of vertical and horizontal egress travel from any occupied portion of a building or structure to a public way. A means of egress consists of three separate and distinct parts: the exit access, the exit and the exit discharge.
41. ELAP: Environmental Laboratory Approval Program administered by the New York State Department of Health.
42. Encapsulant (sealant) or Encapsulating Agent: Liquid material which can be applied to ACM and which temporarily controls the possible release of asbestos fibers from the material either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components together (penetrating encapsulant). A thin coat of lockdown encapsulant shall be applied to all surfaces in the work area which were not the subject of removal or abatement, including the cleaned layer of the surface barriers, but excepting sprinklers, standpipes, and other active elements of the fire suppression system.
43. Encapsulation: The coating or spraying of asbestos-containing material encapsulant. A thin coat of lockdown encapsulant shall be applied to all surfaces in the work area which were not the subject of removal or abatement, including the cleaned layer of the surface barriers, but excepting sprinklers, standpipes, and other active elements of the fire suppression system.
44. Enclosure: Construction of airtight walls and/or ceilings between ACM and the facility environment, or around surfaces coated with ACM, or any other appropriate procedure as determined by the NYCDEP which prevents the release of asbestos fibers.
45. EPA or USEPA: United States Environmental Protection Agency.
46. Equipment Room: Contaminated area or room that is part of the worker decontamination enclosure system with provisions for the storage of contaminated clothing and equipment.
47. Exit: That portion of a means of egress system which is separated from other interior spaces of a building or structure by fire-resistance-rated construction

ASBESTOS ABATEMENT

to provide a protected path of egress travel between the exit access and the exit discharge.

48. FDNY: The Fire Department of the City of New York.
49. Fiber: An acicular single crystal or a similarity elongated polycrystalline aggregate which displays some resemblance to organic fibers by having such properties as flexibility, high aspect ratio, silky luster, axial lineation, and others, and which has attained its shape primarily through growth rather than cleavage.
50. Fixed Object: A unit of equipment, furniture, or other item in the work area which cannot be removed from the work area. Fixed objects shall include equipment, furniture, or other items that are attached, in whole or in part, to a floor, ceiling, wall, or other building structure or system or to another fixed object and cannot be reasonably removed from the work area. Fixed objects shall also include pipes and other equipment inside the work area which are not the subject of the asbestos project. Active fire suppression system components shall not be considered fixed objects.
51. Glovebag technique: shall mean a method for removing asbestos-containing material from heating, ventilation and air conditioning (HVAC) ducts, short piping runs, valves, joints, elbows, and other nonplanar surfaces. The glovebag assembly is a manufactured device consisting of a large bag (constructed of at least 6-mil transparent plastic), two inward-projecting long sleeve gloves, one inward-projecting waterwand sleeve, an internal tool pouch, and an attached, labeled receptacle for asbestos waste. The glovebag is constructed and installed in such a manner that it surrounds the object or area to be decontaminated and contains all asbestos fibers released during the removal process.
52. HEPA-Filter: High efficiency particulate air filter capable of trapping and retaining 99.97 percent of particles (asbestos fibers) greater than 0.3 micrometers mass median aerodynamic equivalent diameter.
53. HEPA vacuum equipment: "HEPA vacuum equipment" shall mean vacuuming equipment with a HEPA filter.
54. Holding Area: Chamber in the equipment decontamination enclosure located between the washroom and an uncontaminated area.
55. Homogeneous Work Area: Portion of the Work Area that contains one type of ACM and/or where one type of abatement is used.
56. Industrial Hygiene: Science and art devoted to the recognition, evaluation, and control of those environmental factors or stresses, arising in or from the work place, which may cause sickness, impaired health and well being, or

ASBESTOS ABATEMENT

significant discomfort and inefficiency among worker or among the citizens of the community.

57. Industrial Hygienist: Individual having a college or university degree or degrees in Engineering, Chemistry, Physics or Medicine, or related Biological Sciences who, by virtue of special studies and training, has acquired competence in industrial hygiene. Such special studies and training must have been sufficient in all of the above cognate sciences to provide the abilities:
 - a. To recognize the environmental factors and to understand their effect on people and their well being; and
 - b. To evaluate, on the basis of experience and with the aid of quantitative measurement techniques, the magnitude of these stresses in terms of ability to impair people's health and well being; and
 - c. To prescribe methods to eliminate, control, or reduce such stresses when necessary to alleviate their efforts.
58. Isolation Barrier: The construction of partitions, the placement of solid materials, and the plasticizing of apertures to seal off the work place from surrounding areas and to contain asbestos fibers in the work area.
59. Large Asbestos Project: Asbestos project involving the disturbances (e.g., removal, enclosure, encapsulation) of 260 linear feet or more of ACM or 160 square feet or more of ACM.
60. Log: An official record of all activities that occurred during the project. At a minimum, the log shall identify the building owner, agent, asbestos abatement contractor, and workers, and other pertinent information including daily activities, cleanings and waste transfers, names and certificate numbers of asbestos handler supervisors and asbestos handlers; results of inspections of decontamination systems, barriers, and negative pressure ventilation equipment; summary of corrective actions and repairs; work stoppages with reason for stoppage; manometer readings at least twice per work shift; daily checks of emergency and fire exits and any unusual events.
61. Minor Project: A project involving the disturbance (e.g., removal, enclosure, encapsulation, repair) of 25 linear feet or less of asbestos containing material or 10 square feet or less of asbestos containing material.
62. Movable Object: Unit of equipment or furniture in the Work Area that can be removed from the Work Area.

ASBESTOS ABATEMENT

- 63. Negative Air Pressure Equipment: Portable local exhaust system equipped with HEPA filtration. The system shall be capable of creating a negative pressure differential between the outside and inside of the Work Area.
- 64. NESHAPS: National Emission Standards for Hazardous Air Pollutants.
- 65. NFPA: The National Fire Protection Association.
- 66. NIOSH: National Institute for Occupational Safety and Health.
- 67. DEP or NYCDEP: New York City Department of Environmental Protection
- 68. NYSDOL: New York State Department of Labor.
- 69. NYSDOL ICR 56: "NYSDOL ICR 56" shall mean Part 56 of the Official Compilation of Codes, Rules and Regulations of the State of New York or 12 NYCRR Part 56.
- 70. NYSDOH: The New York State Department of Health.
- 71. Obstruction: The blocking of a means of egress with any temporary structure or barrier. A double layer of fire-retardant 6-mil polyethylene sheeting shall not be considered an obstruction when it is prominently marked as an exit with photo luminescent signage or paint and cutting tools (knife, razor) are attached to the work area side of the sheeting for use in the event that the sheeting must be cut to permit egress. A corridor shall not be considered obstructed when there is a clear path measuring at least three (3) feet wide.
- 72. Occupied Area: Area of the work site where abatement is not taking place and where personnel or occupants normally function or where workers are not required to use personal protective equipment.
- 73. OSHA: Occupational Safety and Health Administration.
- 74. Outside air: "Outside air" shall mean the air outside the work place.
- 75. Person: Individual, partnership, company, corporation, association, firm, organization, governmental agency, administration, or department, or any other group of individuals, or any officer or employee thereof.
- 76. Personal Air Monitoring: Method used to determine employees' exposure to airborne asbestos fibers. The sample is collected outside the respirator in the worker's breathing zone.
- 77. Personal Protective Equipment (PPE): Appropriate protective clothing, gloves, eye protection, footwear, and head gear.

ASBESTOS ABATEMENT

78. Phase Contrast Microscopy (PCM): The measurement protocol for the assessment of the fiber content of air. (NIOSH Method 7400).
79. Physician: Person licensed or otherwise authorized under Article 131 Section 65.22 of the New York State Education Law.
80. Plasticize: To cover floors and walls with fire retardant plastic sheeting as herein specified or by using spray plastics as acceptable to the Department.
81. Polarized Light Microscopy (PLM): The measurement protocol for the assessment of the asbestos content of bulk materials. (Interim Method for the Determination of Asbestos Materials in Bulk Insulation Samples- 40 CFR Part 763, Subpart F, Appendix A as amended on September 1, 1982)
82. Project Designer: A person who holds a valid Project Designer Certificate issued by the New York State Department of Labor.
83. Project Monitor: A person who holds a valid Project Monitor Certificate issued by the New York State Department of Labor.
84. Qualitative Fit Test: Individual test subject's responding (either voluntarily or involuntarily) to a chemical challenge outside the respirator face-piece. Acceptable methods include irritant smoke test, odorous vapor test, and taste test.
85. Quantitative Fit Test: Exposing the respiratory wearer to a test atmosphere containing an easily detectable, nontoxic aerosol, vapor or gas as the test agent. Instrumentation, which samples the test atmosphere and the air inside the face-piece of the respirator, is used to measure quantitatively the leakage into the respirator. There are a number of test atmospheres, test agents, and exercises to perform during the test.
86. Registered Design Professional: A person licensed and registered to practice the professions of architecture or engineering under the Education Law of the State of New York.
87. Removal: Stripping of any asbestos- containing materials from surfaces or components of a facility or taking out structural components in accordance with 40 CFR 61 Subparts A and M.
88. Renovation: An addition or alteration or change or modification of a building or the service equipment thereof, that is not classified as an ordinary repair as defined in §27-125 of the Administrative Code of the City of New York.

ASBESTOS ABATEMENT

89. Repair: Corrective action using specified work practices (e.g., glovebag, plastic tent procedures, etc.) to minimize the likelihood of fiber release from minimally damaged areas of ACM.
90. Replacement material: Any material used to replace ACM that contains less than .01 percent asbestos.
91. Shift: A worker's, or simultaneous group of workers', complete daily term of work.
92. Shower Room: Room between the clean room and the equipment room in the worker decontamination enclosure with hot and cold running water controllable at the tap and arranged for complete showering during decontamination.
93. Small Asbestos Project: Asbestos project involving the disturbance (e.g., removal, enclosure, encapsulation) of more than 25 and less than 260 linear feet of ACM or more than ten and less than 160 square feet of ACM.
94. Staging Area: Work Area near the waste transfer airlock where containerized asbestos waste has been placed prior to removal from the Work Area.
95. Strip: To remove asbestos materials from any part of the facility.
96. Structural Member: Load-supporting member of a facility, such as beams and load-supporting walls, or any non-load-supporting member, such as ceiling and non-load-supporting walls.
97. Surface barriers: The plasticizing of walls, floors, and fixed objects within the work area to prevent contamination from subsequent work.
98. Surfactant: Chemical wetting agent added to water to improve penetration.
99. Transmission Electron Microscopy (TEM): The measurement protocol for the assessment of the asbestos fiber content of air. Interim Transmission Electron Microscopy Analytical Methods-40 CFR Part 763, Subpart E, Appendix A.
100. Visible Emissions: Emissions containing particulate material that are visually detectable without the aid of instruments.
101. Washroom: Room between the Work Area and the holding area in the equipment decontamination enclosure system where equipment and waste containers are wet cleaned and/or HEPA-vacuumed prior to disposal.

ASBESTOS ABATEMENT

102. Waste decontamination enclosure system: "Waste decontamination enclosure system" shall mean the decontamination enclosure system designated for the controlled transfer of materials and equipment, consisting of a washroom and a holding area.
103. Wet Cleaning: "Wet cleaning" shall mean the removal of asbestos fibers from building surfaces and objects by using cloths, mops, or other cleaning tools which have been dampened with water.
104. Wet methods: "Wet methods" shall mean the use of amended water or removal encapsulants to minimize the generation of fibers during ACM disturbance.
105. Work Area: Designated rooms, spaces, or areas of the building or structure where asbestos abatement activities take(s) place.
106. Worker Decontamination Enclosure System: Portion of a decontamination enclosure system designed for controlled passage of workers and authorized visitors, consisting of a clean room, a shower room, and an equipment room separated from each other and from the Work Area by airlocks and curtained doorways.
107. Work Place: The work area and the decontamination enclosure system(s).
108. Work Place Safety Plan: Construction documents prepared by a registered design professional and submitted for review by DEP in order to obtain an asbestos abatement permit. Such plan shall include, but not be limited to, plans, sections, and details of the work area clearly showing the extent, sequence, and means and methods by which the work is to be performed.
109. Work Site: Premises where abatement activity is being performed. May be composed of one or more Work Areas.

1.06 STANDARD OPERATING PROCEDURES

- A. Develop and implement a written standard procedure for abatement work to ensure maximum protection and safeguard from asbestos exposure of the workers, visitors, employees, public, and environment.
- B. TELEPHONE PAGING DEVICE

The asbestos abatement contractor or his authorized representative shall, at all times during the normal workday or during periods of overtime work under this Contract, carry a digital telephone paging device ("Beeper") and/or cellular telephones which can be activated by a telephone number in the 212 or 646 or 718 or 917 or 929 area code. He shall supply the Department of Design and Construction with the activation number for the device and he is liable to respond

ASBESTOS ABATEMENT

back to the calls from DDC within the next one (1) hour period after he receives calls from DDC. The cost to the asbestos abatement contractor for this device and all charges accruing thereto is deemed included in the work..

C. The standard operating procedure shall ensure:

1. Tight security from unauthorized entry into the workspace.
2. Restriction of asbestos abatement contractor's personnel to the immediate Work Area and access/egress routes.
3. Donning of proper protective clothing and respiratory protection prior to entering the Work Area.
4. Safe work practices in the work place, including provisions for inter-room communications, exclusion of eating, drinking, smoking, or in any way breaking the respiratory protection.
5. Proper exit practices from the work space to the outside through the showering and decontamination facilities.
6. Removing asbestos in a way that minimizes release of fibers.
7. Packing, labeling, loading, transporting, and disposing of contaminated material in a way that minimizes exposure and contamination.
8. Emergency evacuation procedures, for medical or safety situations, to minimize the potential exposure to airborne asbestos fibers for emergency personnel, building occupants, and building environment.
9. Safety from accidents in the workspace, especially from electrical shocks, fall hazards associated with scaffolding, slippery surfaces, and entanglements in loose hoses and equipment.
10. Provisions for effective supervision, air monitoring and personnel monitoring for exposure during the work.
11. Engineering controls that minimize exposure to fibers within the workspace.
12. The asbestos abatement contractor shall provide a 24-hour fire watch throughout the entire term of the project, to protect against fire and unauthorized entry into the workspace. Fire watch shall be performed by an individual who is a certified asbestos worker capable of entering the Work Area for regular inspections.

ASBESTOS ABATEMENT

D. Provide an Asbestos Handler Supervisor to provide continuous supervision of all work, and to be responsible for the following:

1. Ensure that individuals are using proper personal protective equipment, are trained in its use and hold valid NYCDEP and NYSDOL Asbestos Handler certificates
2. Maintain entry log records and ensure that they are recorded in accordance with the provisions of Title 15, Chapter 1 of RCNY and NYSDOL ICR 56.
3. Surveillance of the Work Areas at a minimum of once per work shift or as required by Title 15, Chapter 1 of RCNY and NYSDOL ICR 56 -7.3, to ensure the integrity of work place isolation, negative pressure equipment and workers personal protective equipment is not torn or ripped and that respiratory protection is worn at all times.
4. Ensure that sufficient personal protective equipment is stored in the clean room.
5. Take precautions to prevent heat stress. Precautions include, but are not limited to, selecting lightweight protective clothing, reducing the work rate, and providing adequate fluid breaks.
6. Perform work area inspection with project monitor prior to the commencement of final clearance air monitoring.
7. The asbestos abatement contractor shall retain the asbestos handler supervisor to perform a visual inspection prior to the post-abatement clearance air monitoring to confirm that all containerized waste has been removed from work and holding areas and there is no visible ACM debris or residue on or about all abated surfaces.

E. ENGINEERING CONTROLS

1. The 8-hour time weighted average airborne concentration of fibers to which any passerby may be exposed shall not exceed 0.01 fibers per cubic centimeter of air when fibers have a physical dimension longer than 5 micrometers as determined by the method prescribed in these Specifications.
2. All asbestos projects shall utilize negative pressure ventilation equipment.
 - a. The asbestos abatement contractor shall use a manometer to document the pressure differential. The asbestos abatement contractor shall install and make the manometer operational once the negative pressure has been established in the work area. Magnahelic manometers shall be calibrated at least every six months and a copy

ASBESTOS ABATEMENT

of the current calibration certification shall be available at the work site.

3. Negative pressure ventilation equipment shall be installed and operated to provide at least one air change in the work area every 15 minutes. Where there are no floor or wall barriers because floor or wall material is being abated, there shall be at least one air change in the work area every ten minutes.
4. The negative pressure ventilation equipment shall operate continuously, 24 hours a day, from the establishment of isolation barriers through successful clearance air monitoring. If such equipment shuts off, adjacent areas shall be monitored for asbestos fibers.
5. A static negative air pressure of 0.02 inches (minimum) water column shall be maintained at all times in the work place during abatement to ensure that contaminated air in the Work Area does not filter back to uncontaminated areas.
6. If the contaminated area of an asbestos project covers the entire floor of the affected building, or an area greater than 15,000 square feet on any given floor, the installation of a negative air cut off switch or switches shall be required at a single location outside the work place, such as inside a stairwell, or at a secured location in the ground floor lobby when conditions warrant. The required switch or switches shall be installed by a licensed electrician pursuant to a permit issued by the Department of Buildings. If negative pressure ventilation equipment is used on multiple floors, the cut off switch shall be able to turn off the equipment on all floors.
7. On loss of negative pressure or electric power to the negative pressure ventilating units, abatement shall stop immediately and shall not resume until power is restored and negative pressure ventilation equipment is operating again.
8. Negative pressure ventilation equipment shall be exhausted to the outside of the building away from occupied areas.
 - a. All openings (including but not limited to operable windows, doors, vents, air intakes or exhausts of any mechanical devices) less than 15 feet from the exterior exhaust duct termination location shall be plasticized with two layers of fire retardant 6-mil polyethylene sheeting, or a second negative pressure ventilation unit with the primary unit's capacity shall be connected in series prior to exhausting to the outside.
 - b. Negative pressure ventilation equipment shall exhaust away from areas accessible to the public.

ASBESTOS ABATEMENT

- c. All ducting shall be sealed and braced or supported to maintain airtight joints. Ducts shall be reinforced and shall be installed so as to prevent breakage. Damage to ducts must be repaired immediately.
9. Where ducting to the outside is not possible, a second negative pressure ventilation unit compatible with the primary unit's capacity shall be connected in series. The area receiving the exhaust shall have sufficient, non-recycling exhaust capacity to the outside of the structure.
10. In the event that there is a failure of the containment system or a breach in the Isolation Barriers, all abatement work will cease and the asbestos abatement contractor will immediately correct the condition. Abatement work will not resume until the Work Area has been smoke tested by the third party laboratory and approved by the Construction Project Manager.

F. LOCKDOWN ENCAPSULATION PROCEDURES

1. The following procedures shall be followed to seal in non-visible residue while conducting lockdown encapsulation on all surfaces from which ACM has not been removed:
 - a. Only encapsulants rated as acceptable or marginally acceptable on the basis of Battelle Columbus Laboratory test procedures and rating requirements developed under the 1978 USEPA Contract shall be used for lockdown encapsulation.
 - b. The encapsulant solvent or vehicle shall not contain a volatile hydrocarbon unless reviewed and approved by DEP.
 - c. Latex paint with solids content greater than 15 percent shall be considered a lockdown sealant for coating all non-metallic surfaces.
 - d. Encapsulants shall be applied using airless spray equipment. Spraying is to occur at the lowest pressure range possible to minimize fiber release from encapsulant impact at the surface. It shall be applied with a consistent horizontal or vertical motion.
 - e. The cleaned layer of the surface barriers shall be removed from walls and floors.

The isolation barriers shall remain in place throughout cleanup. Decontamination enclosure systems shall remain in place and be utilized. A thin coat of lockdown encapsulant shall be applied to all surfaces in the work area which were not the subject of removal or abatement, including the cleaned layer of the surface barriers, but excepting sprinklers, standpipes, and other active elements of the fire suppression system.

1.07 NOTIFICATIONS, PERMITS, WARNING SIGNS, LABELS, AND POSTERS

- A. The asbestos abatement contractor shall submit an Asbestos Project Notification (ACP-7) to the NYCDEP listing each work area within the building separately one week in advance of the start of work.
- B. The asbestos abatement contractor shall obtain an asbestos abatement permit authorizing the performance of construction work as required for asbestos projects involving one or more of the following activities:
 - 1. Obstruction of an exit door leading to an exit stair or the exterior of the building;
 - 2. Obstruction of an exterior fire escape or access to that fire escape;
 - 3. Obstruction of a fire-rated corridor leading to an exit door;
 - 4. Removal of handrails in an exit stair or ramp;
 - 5. Removal or dismantling of any fire alarm system component including any fire alarm-initiating device (e.g., smoke detectors, manual pull station);
 - 6. Removal or dismantling of any exit sign or any component of the exit lighting system, including photo luminescent exit path markings;
 - 7. Removal or dismantling of any part of a sprinkler system including piping or sprinkler heads;
 - 8. Removal or dismantling of any part of a standpipe system including fire pumps or valves;
 - 9. Removal of any non-load bearing / non-fire-rated wall (greater than 45 square feet or 50 percent of a given wall);
 - 10. Any plumbing work other than the repair or replacement of plumbing fixtures;
 - 11. Removal of any fire-resistance rated portions of a wall, ceiling, floor, door, corridor, partition, or structural element enclosure including spray-on fire resistance rated materials;
 - 12. Removal of any fire damper, smoke damper, fire stopping material, fire blocking, or draft stopping within fire-resistance rated assemblies or within concealed spaces;
 - 13. Any work that otherwise requires a permit from the DOB (full demolitions, alterations, renovations, modifications or plumbing work).

ASBESTOS ABATEMENT

- C. The asbestos abatement contractor shall provide a floor plan showing the areas of the building under abatement and the location of all fire exits in said areas. It shall be prominently posted in the building lobby or comparable location, along with a notice stating the location within the building of the negative air cutoff switch, if applicable.
- D. The asbestos abatement contractor shall submit, as required, an asbestos abatement permit due to one or more of the activities listed in 1.07 (B) (1-8) and (B) (13) of this specification. The asbestos abatement contractor is responsible for submitting, with an asbestos project notification, a work place safety plan (WPSP) and any other applicable construction documents. These documents must be prepared by a registered design professional.
- E. A WPSP is not required for projects requiring an asbestos abatement permit due to one or more of the activities listed in 1.07 (B) (9-12) of this specification. The asbestos abatement contractor shall submit, together with the asbestos project notification, all applicable asbestos abatement permit construction documents.
- F. The asbestos abatement contractor shall retain a Registered Design Professional to perform the inspections required pursuant to Title 28 of the Administrative Code, including but not limited to special inspections required by Chapter 17 of the Building Code, as follows:
 - 1. A final inspection shall be performed by a registered design professional retained by the asbestos abatement contractor after all work authorized by the asbestos abatement permit is completed. The person performing the inspection shall note all failures to comply with the provisions of the Building Code or approved asbestos abatement permit and shall promptly notify the owner in writing. All defects noted in such inspection shall be corrected. The final inspection report shall either:
 - a. Confirm:
 - (1) That the construction work is complete, including the reinstallation or reactivation of any building fire safety or life safety component.
 - (2) That any defects previously noted have been corrected.
 - (3) That all required inspections were performed.
 - (4) That the work is in substantial compliance with the approved asbestos abatement permit construction documents, the Building Code, and other applicable laws and rules.
 - b. Confirm:

ASBESTOS ABATEMENT

- (1) That the construction work does not return the building (or portion thereof) affected by the abatement project to a condition compliant with the building code and other applicable laws and rules, but that the registered design professional has reviewed an application for asbestos abatement permit construction documents approval that has been approved by the department of buildings, and the subsequent scope of work as approved will, upon completion, render all areas affected by the asbestos project in full compliance with the building code and all applicable laws and rules.
 - (2) That any defects previously noted that are not addressed by the subsequent scope of work as approved by the department of buildings, have been corrected.
 - (3) That all required inspections that are not addressed by the subsequent scope of work as approved by the department of buildings were performed.
 - (4) That all completed work pursuant to an asbestos abatement permit is in substantial compliance with the approved asbestos abatement permit construction documents.
- G. The asbestos abatement contractor shall provide the final inspection reports to be filed with DEP on A-TR1 form. Records of final inspections made by registered design professionals shall be submitted to DDC as part of the close out document package.
- H. Erect bilingual (English-Spanish) warning signs around the work space and at every point of potential entry from the outside and at main entrance to building which can be viewed by the public without obstruction, in accordance with OSHA 29 CFR 1926.1101 (K) (Sign Specifications) and Title 15, Chapter 1 of RCNY. The warning signs shall be a bright color so that they will be easily noticeable. The size of the sign and the size of the lettering shall be no less than OSHA requirements.
- I. Provide the required labels for all polyethylene bags and all drums utilized to transport contaminated material to the landfill in accordance with OSHA 29 CFR 1926.1101 (K)(2) and by 49 CFR Parts 171 and 172 of the Department of Transportation regulations.
- J. Provide any other signs, labels, warnings, and posted instructions that are necessary to protect, inform and warn people of the hazard from asbestos exposure. Post in a prominent and convenient place for the workers a copy of the latest applicable regulations from OSHA, EPA, NIOSH, State of New York and

ASBESTOS ABATEMENT

New York City and any additional items mandated for posting by the aforementioned regulations.

- K. Furnish all permits, variances and notices required to perform the Work.

1.08 EMERGENCY PRECAUTIONS

- A. Establish emergency and fire exits from the Work Area. The clean side of all emergency exits shall be equipped with two full sets of protective clothing and respirators at all times.
- B. Notify local medical emergency personnel, both ambulance crews and hospital emergency room staff prior to commencement of abatement operations as to the possibility of having to handle contaminated or injured workmen, and shall be advised on safe decontamination.
- C. Prepare to administer first aid to injured personnel after decontamination. Seriously injured personnel shall be treated immediately or evacuated immediately for decontamination. When an injury occurs, precautions shall be taken to reduce airborne fiber concentrations (i.e., misting of the air with water) until the injured person has been removed from the Work Area.
- D. Notify, before actual removal of the asbestos material, the local police and fire departments to the danger of entering the Work Area. Asbestos abatement contractor shall make every effort to help these agencies form plans of action should their personnel need to enter the contaminated area.

1.09 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, bound and indexed. The detailed plan of action must be submitted at least five (5) days prior to the pre-construction meeting.
 - 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.

ASBESTOS ABATEMENT

- 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.
 - (4) A schedule of equipment to be used including numbers and types of all major equipment such as HEPA Air Filtration Units, HEPA-vacuums, airless sprayers, Water Atomizing Devices and Type "C" compressors.
- e. A written plan and shop drawings for preparation of work site and decontamination chamber.
- f. Description of protective clothing and approved respirator to be used, make, model, NIOSH approval numbers.
- g. Delineation of responsibility of work site supervision, including competent person, with names, resumes, and home telephone numbers.
- h. Explanation of decontamination sequence and isolation techniques.
- i. Description of specific equipment to be utilized, including make and model number of air filtration devices, vacuums, sprayers, etc.
- j. Description of any prepared methods, procedures, techniques, or equipment other than those specified in the Contract Documents.
- k. Explanation of the handling of asbestos contaminated wastes including EPA and NYCDEP identification numbers of Waste Hauler.

ASBESTOS ABATEMENT

- l. Description of the final clean-up procedures to be used.
- m. Name and qualifications of asbestos abatement contractor's Air Monitor including AIHA accreditation, and proof of NIOSH PAT and NIST/NVLAP Bulk Quality Assurance Proficiency of OSHA samples for approval by the City of New York Department of Design and Construction.
- n. 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) 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.
- o. Material Safety Data Sheets (MSDS) 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 MSDS are reviewed.
- p. Worker Training and Medical Surveillance: Asbestos abatement contractor shall submit a list of the persons who will be employed by him in 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.
- q. Logs: Specimen copies of daily progress log, visitor's log, and disposal log.
 - (1) The asbestos abatement contractor shall provide a permanently bound log book of minimum 8-1/2" x 11" size at the entrance to the Worker and Waste Decontamination enclosure system as hereinafter specified. Log book shall contain on title page the project name, name, address and phone number of Environmental Control Representative; name, address and phone number of asbestos abatement contractor; name, address and phone number of asbestos abatement contractor and City's air testing entity; emergency numbers including, but not limited to local Fire/Rescue Department. Log book shall contain a list of personnel approved by the laboratory 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.

ASBESTOS ABATEMENT

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 a copy of the logbook containing a day-to-day record of personnel log entries countersigned by the Construction Project Manager every day.

- r. 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. Submit copies of the following items to the Construction Project Manager during the work:
- 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 asbestos abatement contractor's current work progress shall be submitted for review by the Construction Project Manager at weekly progress meetings.
 - 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,

ASBESTOS ABATEMENT

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 DEP and NYSDOL supervisor and handler certificates for all workers engaged in the project;
 - c. Copies of all project notifications and reports filed with DEP and NYSDOL 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. All data related to bulk sampling including the results of any asbestos surveys performed by an asbestos investigator;
 - h. Copies of all asbestos waste manifests;
 - i. A copy of all Project Monitor's Reports (ACP-15).
 - j. A copy of each ATR-1 Form completed for the asbestos project (if required).
 - k. A copy of each Asbestos Project Conditional Closeout Report (ACP-20).
 - l. A copy of the Asbestos Project Completion Form (ACP-21).

ASBESTOS ABATEMENT

9. The asbestos abatement contractor shall submit one of the following certifications to the DOB, with a copy provided to DDC:
 - a. Asbestos Project Completion Form. If an asbestos project has been performed, a copy of the asbestos project completion form issued by DEP shall be submitted to DOB, with a copy being provided to DDC, prior to the issuance of a DOB permit and to any amendment of the underlying construction document approval which increases the scope of the project to include (a) work area(s) not previously covered.
 - b. An Asbestos Project Conditional Close-out Form. If an asbestos project has been performed a copy of the asbestos project conditional close-out form issued by DEP shall be submitted to DOB, with a copy being provided to DDC, prior to the issuance of a DOB permit and to any amendment of the underlying construction document approval which increases the scope of the project to include (a) work area(s) not previously covered.

1.10 QUALITY ASSURANCE

- A. All work required for the completion of this project or called for in this Specification must be executed in a workmanlike manner by using the appropriate methods established by regulatory requirements and/or industrial standards. All workmanship or work methods are subject to review and acceptance by the Construction Project Manager. Throughout the Specification, reference is made to codes and standards which establish qualities, levels or types of workmanship which will be considered acceptable. It is the asbestos abatement contractor's responsibility to comply with these codes and standards during the execution of this work.
- B. All materials and equipment required or consumed during the work of this Contract must meet the minimum acceptable criteria established by codes and standards referenced elsewhere in this Specification. Materials and equipment must be submitted for prior approval as part of the asbestos abatement contractor's "Shop Drawings".
- C. It is the asbestos abatement contractor's responsibility, when so required by the Specification or upon written request from the Commissioner or his representative to furnish all required proof that workmanship, materials and/or equipment meet or exceed the codes and standards referenced. Such proof shall be in the form requested, typically a certified report or test conducted by a testing entity approved for that purpose by DDC.

ASBESTOS ABATEMENT

- D. The a asbestos abatement contractor shall furnish proof that employees working under his supervision have had instruction on the dangers of asbestos exposure, on respirator use, decontamination, and OSHA regulations. This proof shall be in the form of a notarized affidavit to the effect that the above requirements have been satisfied.
- E. The a asbestos abatement contractor will have at all times in his possession and in view at the job site the OSHA regulations 29 CFR 1910.1001, and 1926.1101 Asbestos, and Environmental Protection Agency 40 CFR, Part 61, subpart B: National Emission Standard for asbestos, asbestos stripping, work practices and disposal of asbestos waste. He shall also have one copy of NYC Title 15, Chapter 1 of RCNY and NYS DOL ICR 56 at the job site at all times.
- F. Familiarity with Pertinent Codes and Standards: In procuring all items used in this work, it is the a asbestos abatement contractor's responsibility to verify the detailed requirements of the specifically named codes and standards and to verify that the items procured for use in this work meet or exceed the specified requirements, and are suitable for their intended use.
- G. Rejection of Non Complying Items: The Commissioner reserves the right to reject items incorporated into the work that fail to meet the specified minimum requirements. The Commissioner further reserves the right, and without prejudice to other recourse that maybe taken, to accept non-complying items subject to an adjustment in the Contract amount as approved by the City.
- H. Applicable Regulations, Codes and Standards: Applicable standards listed in these Specifications include, but are not necessarily limited to, standards promulgated by the following agencies and organizations:
1. American National Standards Institute (ANSI)
(Successor to USASI and ASA)
25 West 43rd Street (between 5th and 6th Avenue) 4th Floor
New York, NY 10036
212-642-4900
 2. American Society for Testing and Materials (ASTM)
100 Bar Harbor Drive
West Conshohocken, PA 19428-2959
610-832-9500
 3. National Institute for Occupational Safety and Health (NIOSH)
Robert A. Taft Laboratory
4676 Columbia Pkwy
Mailstop R12 Cincinnati, Ohio 45226
513-841-4428

ASBESTOS ABATEMENT

4. National Electrical Code (NEC)
See NFPA
5. National Fire Protection Association (NFPA)
1 Batterymarch Park
Quincy, Massachusetts 02169-7471
617-770-3000
6. New York City Fire Department (FDNY)
9 Metrotech Center
Brooklyn, NY 11201-5431
718-999-2117
7. New York City Department of Buildings (NYC DOB)
Enforcement Division
280 Broadway, New York, New York 10007
212- 566-2850
8. New York City Department of Environmental Protection (NYCDEP)
Bureau of Environmental Compliance
Asbestos Control Program
59-17 Junction Boulevard, 8th Floor
Corona, New York 11368
718-595-3682
9. New York City Department of Health and Mental Hygiene (NYC DOHMH)
Environmental Investigation
125 Worth Street
New York, New York 10013
212-442-3372
10. New York State Department of Labor (NYSDOL)
Division of Safety and Health
Engineering Services Unit
State Office Building Campus
Albany, New York 12240-0010
11. New York City Department of Sanitation
125 Worth Street, Room 714
New York, New York 10013
212-566-1066
12. Occupational Safety and Health Administration (OSHA)
Region II - Regional Office
201 Varick Street, Room 908
New York, New York 10014
212-337-2378

ASBESTOS ABATEMENT

13. United States Environmental Protection Agency (EPA or USEPA)
Region II
Asbestos NESHAPS Contact
Air and Waste Management Division
(Air Compliance Branch) – USEPA
290 Broadway, 21st Floor
New York, New York 10007-1866
212-637-3660

- I. Post all applicable regulations in a conspicuous place at the job site. Assure that the regulations are not altered, defaced or covered by other materials. One copy of each regulation must also be kept at the Asbestos abatement contractor's office.

1.11 CITY/ASBESTOS ABATEMENT CONTRACTOR RESPONSIBILITIES

- A. The normal occupants of the Work Areas will be relocated by the City prior to the performance of the abatement work and returned there to at the conclusion of the abatement work, at no cost to the asbestos abatement contractor. However, the asbestos abatement contractor shall protect all furniture and equipment in the Work Areas in a manner as hereinafter specified. In addition, the asbestos abatement contractor shall perform the work of this Contract in a manner that will be least disruptive to the normal use of the non-Work Areas in the building.
- B. Asbestos abatement contractor shall be responsible for cleaning all portable items not specifically addressed by the Facility, in the Work Areas, or dispose of same as asbestos contaminated waste.
- C. Facility to provide asbestos abatement contractor with a list of items that cannot be removed and need special attention.
- D. Facility to stop all deliveries that may be scheduled to the Work Area while work is in progress.
- E. Facilities to have authorized personnel on site at all times or supply the asbestos abatement contractor with means of contacting such personnel without unreasonable delay. Such personnel shall have access to all areas, have knowledge of electrical, and air handling equipment. Such personnel shall assist the asbestos abatement contractor in case of any power failure or breakdown to shut down air supply systems, to reset and control all protective systems such as alarms, sprinklers, locks, etc. The Facility shall ensure no active air handling systems are operating within the Work Area.
- F. City will not occupy the portions of the building, in which work is being performed during the entire asbestos removal operation, including completion of clean up.

ASBESTOS ABATEMENT

- G. Asbestos abatement contractor shall provide a plan for 24 hour job security both for prevention of theft and for barring entry of curious but unprotected personnel into Work Areas.
- H. Asbestos abatement contractor shall provide surveillance by a fire watch and set forth procedures to be taken for the safety of building occupants in the event of an emergency, in accordance with the WPSP.
- I. Should the failure of any utility occur, the City will not be responsible to the asbestos abatement contractor for loss of time or any other expense incurred.
- J. Facility will be responsible to notify the asbestos abatement contractor of any planned electrical power shutdowns in order to ensure that there are no power interruptions in the negative air pressure systems.
- K. Asbestos abatement contractor shall remove all flammable materials from the work area and all sources of ignition (including but not limited to pilot lights) shall be extinguished.
- L. Asbestos abatement contractor shall require a competent person (as defined in OSHA 1926.1101) to perform the following functions and to be on-site continuously for the duration of the project:
 - 1. Monitor the set up of the Work Area enclosure and ensure its integrity.
 - 2. Control entry and exit into the work enclosure.
 - 3. Ensure that employees are adequately trained in the use of engineering controls, proper work practices, proper personal protective equipment and in decontamination procedures.
 - 4. Insure that employees use proper engineering controls, proper work practices, proper personal protective equipment and proper decontamination procedures.
 - 5. The competent person (as defined in OSHA1926.1101) shall check for rips and tears in work suits, and ensure that they are mended immediately or replaced.

1.12 USE OF BUILDING FACILITIES

- A. City shall make available to the asbestos abatement contractor, from existing outlets and supplies, all reasonably required amounts of water and electric power at no charge.

ASBESTOS ABATEMENT

- B. Electric power to all Work Areas shall be shut down and locked out except for electrical equipment that must remain in service. Safe temporary power and lighting shall be provided by asbestos abatement contractor in accordance with applicable codes. All power to Work Areas shall be brought in from outside the area through ground-fault interrupter circuits installed at the source. Stationary electrical equipment within the Work Area, which must remain in service, shall be adequately protected, enclosed and ventilated. The Facility will identify all electric lines that must remain in service. Asbestos abatement contractor shall protect all lines.
- C. Asbestos abatement contractor shall provide, at his own expense, all electrical, water, and waste connections, tie-ins, extensions, and construction materials, supplies, etc. All water tie-ins shall be hard piped with polyethylene or copper piping. At the end of each shift, asbestos abatement contractor shall disconnect all hoses within the work zone and place in equipment room of the worker decontamination unit. Asbestos abatement contractor shall ensure positive shutoff of all water to Work Area during non-working hours.
- D. Utilities:
1. General:
All temporary facilities required to be installed, shall be subject to the approval of the Commissioner. Prior to starting the work at any site; specify clearly the temporary locations of facilities preferably with sketches and submit the same to the Construction Project Manager for approval.
 2. 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. All temporary plumbing or adaptations to supply the needs of the Work Area shall be installed and removed by the asbestos abatement contractor and the cost thereof included in the Lump Sum price for abatement work. Shower water for the decontamination unit shall be provided hot. Heating of water, if necessary, shall be provided by the asbestos abatement contractor.
 3. Electricity:
The Department of Design and Construction will furnish all electricity needed for construction, at no cost to the asbestos abatement contractor in buildings under their jurisdiction. All temporary electrical work or adaptations to supply the needs of the Work Area shall be installed and removed by the asbestos abatement contractor and the cost thereof included in the Lump Sum price for abatement work.

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

ASBESTOS ABATEMENT

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.

A dedicated power supply for the negative pressure ventilating units shall be utilized. The negative air equipment shall be on a ground fault circuit interrupter (GFCI) protected circuit separate from the remainder of the work area temporary power circuits.

- E. Asbestos abatement contractor shall shut down and lock out all electric power to all work areas except for electrical equipment that must remain in service. Safe temporary power and lighting shall be provided in accordance with all applicable codes. Existing light sources (e.g., house lights) shall not be utilized. All power to work areas shall be brought in from outside the area through ground-fault circuit interrupter at the source.
 - 1. If electrical circuits, machinery, and other electrical systems in or passing through the work area must stay in operation due to health and safety requirements, the following precautions must be taken:
 - a. All unprotected cables, except low-voltage (less than 24 volts) communication and control system cables, panel boxes of cables and joints in live conduit that run through the work area shall be covered with three (3) independent layers of six (6) mil fire retardant polyethylene. Each layer shall be individually duct taped and sealed. All three (3) layers of polyethylene sheeting shall be left in place until satisfactory clearance air sampling results have been obtained.
 - b. Any energized circuits remaining in the work area shall be posted with a minimum two (2) inch high lettering warning sign which reads: DANGER LIVE ELECTRICAL - KEEP CLEAR. A sign shall be placed on all live covered barriers at a maximum of ten (10) foot intervals. These signs shall be posted in sufficient numbers to warn all persons authorized to enter the work area of the existence of the energized circuits.
 - 2. Any source of emergency lighting which is temporarily blocked as a result of work place preparation shall be replaced for the duration of the project by battery operated or temporary exit signs, exit lights, or photo luminescent path markings.
- F. Asbestos abatement contractor shall provide a separate temporary electric panel board to power asbestos abatement contractor's equipment. The Facility will designate an existing electrical source in proximity to the Work Area. Asbestos abatement contractor's licensed electrician shall provide temporary tie-in via cable,

ASBESTOS ABATEMENT

outlet boxes, junction boxes, receptacles and lights, all with ground fault interruption. At no time shall extension cords greater than 50-feet in length be allowed. All temporary electrical installation shall be in accordance with OSHA regulations. The electric shut down for power panel tie-in will be on off-hours and must be coordinated with the Facility. Asbestos abatement contractor shall provide to the City a specification and drawing outlining his power requirements at the pre-construction meeting.

- G. Additional electrical equipment (i.e., transformers, etc.), which is necessary due to the lack of existing power on the floor, shall be at the asbestos abatement contractor's expense.
- H. Asbestos abatement contractor shall provide fire protection in accordance with all State and Local fire codes.
- I. Sprinklers, standpipes, and other fire suppression systems shall remain in service and shall not be plasticized.
- J. When temporary service lines are no longer required, they shall be removed by the asbestos abatement asbestos abatement contractor. Any parts of the permanent service lines, grounds and buildings, disturbed or damaged by the installation and/or removal of the temporary service lines, shall be restored to their original condition by the asbestos abatement asbestos abatement contractor. Senior Stationary Engineer will inspect and test all switches, controls, gauges, etc. and shall submit a list to the Construction Project Manager of any equipment damaged by the asbestos abatement asbestos abatement contractor.
- K. Asbestos abatement contractor shall supply hot shower water necessary for use in the decontamination unit.

1.13 USE OF THE PREMISES

- A. Asbestos abatement contractor shall confine his apparatus, the storage of materials, and supplies, and the operation of his workmen to limits established by law, ordinances, and the directions of the Construction Project Manager and the Facility. All flammable or combustible materials shall be properly stored to obviate fire and in areas approved by the Facility.
- B. Asbestos abatement contractor shall assure that no exits from the building are obstructed, that appropriate safety barriers are established to prevent access, and that Work Areas are kept neat, clean, and safe.
- C. Asbestos abatement contractor shall maintain exits from the work area or alternative exits shall be established, in accordance with section 1027 of the New York City Fire Code. Exits shall be checked at the beginning and end of each work shift against blockage or impediments to exiting.

ASBESTOS ABATEMENT

- D. If the openings of temporary structural partitions related to abatement work areas block egress, the partition shall consist of two sheets of fire retardant 6-mil plastic, prominently marked as an exit with photo luminescent paint or signage. Cutting tools (e.g., knife, razor) shall be attached to the work area side of the sheeting for use in the event that the barrier must be cut open to allow egress.
- E. All surrounding work, fixtures, soil lines, drains, water lines, gas pipes, electrical conduit, wires, utilities, duct work railings, shrubbery, landscaping, etc. which are to remain in place shall be carefully protected and, if disturbed or damaged, shall be repaired or replaced as directed by the City, at no additional cost.
- F. All routes through the building to be used by the asbestos abatement contractor shall first be approved by the Construction Project Manager and the Facility.
- G. Attention is specifically drawn to the fact that other asbestos abatement contractors, performing the work of other Contracts, may be (or are) 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 asbestos abatement contractors who may be on (or are on) any site of the work of this Contract. Regulated area exempted.
- H. Temporary toilet facilities must be provided by the asbestos abatement contractor on the site. Coordinate location of facilities with Construction Project Manager. No toilet facilities will be allowed in the Work Area.

1.14 PROTECTION AND DAMAGE

- A. The asbestos abatement contractor is responsible to cover all furniture and equipment that cannot be removed from Work Areas. Moveable furniture and equipment will be removed from Work Areas by asbestos abatement contractor prior to start of work and returned upon successful completion of the final air testing. At the conclusion of the work (after clearance level of air testing reaches the acceptable limit), the asbestos abatement contractor will remove all plastic covering from the walls, floors, furniture, equipment and reinstall furniture and equipment in the cleaned Work Area. The asbestos abatement contractor shall remove all shades, curtains and drapes from the Work Area, and reinstall the same following the final clean up.
- B. Prior to plasticizing, the proposed work areas shall be pre-cleaned using HEPA filtered vacuum equipment and/or wet cleaning methods. Methods that raise dust, such as sweeping or vacuuming with equipment not equipped with HEPA filters, are prohibited.
- C. Use rubber tired vehicles that use non-volatile fuels for conveying material inside building and provide temporary covering, as necessary, to protect floors.

ASBESTOS ABATEMENT

- D. No materials or debris shall be thrown from windows or doors of the building. Building waste system shall NOT be used to remove refuse.
- E. Debris shall be removed from the work site daily. Premises shall be left neat and clean after each work shift, so that work may proceed the next regular workday without interruption. Limited bag storage may take place within the Work Area when approved by the Construction Project Manager.
- F. Protect floors and walls along removal routes from damage, wear and staining with contamination control flooring. All finished surfaces to be protected with Masonite or other rigid sheathing material.
- G. A preliminary inspection for pre-existing damage shall be conducted by asbestos abatement contractor and representative of the City before commencement of the project.

1.15 RESPIRATORY PROTECTION REQUIREMENTS

- A. Respiratory protection shall be worn by all individuals who may be exposed to asbestos fibers from the initiation of the asbestos project until all areas have successfully passed clearance air monitoring in accordance with Regulations and these Specifications.
- B. Asbestos abatement contractor shall develop and implement a written respiratory protection program with required site-specific procedures and elements. The program shall be administered by a properly trained individual. The written respiratory protection program shall include the requirements set forth in OSHA Standard 29 CFR 1910.134, at a minimum.
- C. The Asbestos abatement contractor shall provide workers with individually issued and marked respiratory equipment. Respiratory equipment shall be suitable for the asbestos exposure level(s) in the Work Area(s), as specified in OSHA Standards 26 CFR 1910.134 and 29 CFR 1926.1101, NIOSH Standard 42 CFR 84, or as more stringently specified otherwise, herein.
- D. Where respirators with disposable filter parts are employed, the asbestos abatement contractor will provide sufficient filter parts for replacement as necessary or as required by the applicable regulation.
- E. All respiratory protection shall be NIOSH approved. All respiratory protection shall be provided by asbestos abatement contractor, and used by workers in conjunction with the written respiratory protection program.
- F. Asbestos abatement contractor shall provide respirators selected by an Industrial Hygienist that meet the following requirements:

ASBESTOS ABATEMENT

Table 1. -- Assigned Protection Factors

Type of Respirator	Half mask	Full facepiece	Helmet/hood
1. Air-Purifying Respirator	³ 10	50
2. Powered Air-Purifying Respirator (PAPR)	50	1,000	⁴ 25/1,000
3. Supplied-Air Respirator (SAR) or Airline Respirator			
• Demand mode	10	50
• Continuous flow mode	50	1,000	⁴ 25/1,000
• Pressure-demand or other positive-pressure mode	50	1,000
4. Self-Contained Breathing Apparatus (SCBA)			
• Demand mode	10	50	50
• Pressure-demand or other positive-pressure mode (e.g., open/closed circuit)	10,000	10,000

Notes:

¹Employers may select respirators assigned for use in higher workplace concentrations of a hazardous substance for use at lower concentrations of that substance, or when required respirator use is independent of concentration.

²The assigned protection factors in Table 1 are only effective when the employer implements a continuing, effective respirator program as required by this section (29 CFR 1910.134), including training, fit testing, maintenance, and use requirements.

³This APF category includes filtering facepieces, and half masks with elastomeric facepieces.

⁴The employer must have evidence provided by the respirator manufacturer that testing of these respirators demonstrates performance at a level of protection of 1,000 or greater to receive an APF of 1,000. This level of performance can best be demonstrated by performing a WPF or SWPF study or equivalent testing. Absent such testing, all other PAPRs and SARs with helmets/hoods are to be treated as loose-fitting facepiece respirators, and receive an APF of 25.

⁵These APFs do not apply to respirators used solely for escape. For escape respirators used in association with specific substances covered by 29 CFR 1910 subpart Z, employers must refer to the appropriate substance-specific standards in that subpart. Escape respirators for other IDLH atmospheres are specified by 29 CFR 1910.134 (d)(2)(ii).

- G. Selection of high efficiency filters:
1. All high efficiency filters shall have a nominal efficiency rating of 100 (99.97-percent effective) when tested against 0.3-micrometer monodisperse diethyl-hexyl phthalate (DOP) particles.
 2. Choose N-, R-, or P-series filters based upon the presence or absence of oil particles.
 - a. N-series filters shall only be used for non-oil solid and water based aerosols or fumes.
 - b. R- and P-series filters shall be used when oil aerosols or fumes (i.e., lubricants, cutting fluids, glycerin, etc.) are present. The R-series filters are oil resistant and the P-series filters are oil proof.
 - c. Follow filter manufacture recommendations.
 3. If a vapor hazard exists, use an organic vapor cartridge in combination with the high efficiency filter.
- H. Historical airborne fiber level data may serve as the basis for selection of the level of respiratory protection to be used for an abatement task. Historical data provided by the asbestos abatement contractor shall be based on personal air monitoring performed during work operations closely resembling the processes, type of material, control methods, work practices, and environmental conditions present at the site. Documentation of aforementioned results may be requested by the City and/or Third-Party Air Monitor for review. This will not relieve the asbestos abatement contractor from providing personal air monitoring to determine the time-weighted average (TWA) for the work under contract. The TWA shall be determined in accordance with 29 CFR 1926.1101.
- I. At no time during actual removal operations shall half-mask air purifying respirators be allowed unless a full 8-hour TWA and excursion limit have been conducted, and reviewed by the Construction Project Manager. If the TWA and excursion limit have not been conducted, a Supplied-Air Respirator (SAR) or Airline Respirator or Self-Contained Breathing Apparatus (SCBA) must be used. Use of single use dust respirators is prohibited for the above respiratory protection.
- J. Workers shall be provided with personally issued and individually marked respirators. Respirators shall not be marked with any equipment that will alter the fit of the respirator in any way. Only waterproof identification markers shall be used.

ASBESTOS ABATEMENT

- K. Asbestos abatement contractor shall ensure that the workers are qualitatively or quantitatively fit tested by an Industrial Hygienist initially and every 12 months thereafter with the type of respirator he/she will be using.
- L. Whenever the respirator design permits, workers shall perform the positive and negative air pressure fit test each time a respirator is worn. Powered air-purifying respirators shall be tested for adequate flow as specified by the manufacturer.
- M. No facial hairs (beards) shall be permitted to be worn when wearing respiratory protection that requires a mask-to-face seal.
- N. If a worker wears glasses, a spectacle kit to fit their respirator shall be provided by the asbestos abatement contractor at the asbestos abatement contractor's expense.
- O. Respiratory protection maintenance and decontamination procedures shall meet the following requirements:
 - 1. Respiratory protection shall be inspected and decontaminated on a daily basis in accordance with OSHA 29 CFR 1910.134 (b); and
 - 2. High efficiency filters for negative pressure respirators shall be changed after each shower; and
 - 3. Respiratory protection shall be the last piece of worker protection equipment to be removed. Workers must wear respirators in the shower when going through decontamination procedures as stated in Section 3.03 and/or 3.04.
 - 4. Airline respirators with high efficiency filtered disconnect shall be disconnected in the equipment room and worn into the shower. Powered air-purifying respirator face pieces shall be worn into the shower. Filtered/power pack assemblies shall be decontaminated in accordance with manufacturers recommendations; and
 - 5. Respirators shall be stored in a dry place and in such a manner that the face-piece and exhalation valves are not distorted; and
 - 6. Organic solvents shall not be used for washing of respirators.
- P. Authorized visitors shall be provided with suitable respirators and instruction on the proper use of respirators whenever entering the Work Area. Qualitative fit test shall be done to ensure proper fit of respirator.

1.16 PROTECTIVE CLOTHING

- A. Provide worker protection as required by the most stringent OSHA and/or EPA standards applicable to the work. Provide to all workers, foremen, superintendents, authorized visitors and inspectors, protective disposable clothing consisting of full

ASBESTOS ABATEMENT

body coveralls, head covers, gloves and 18-inch high boot type covers or reusable footwear.

- B. In addition to personal protective equipment for workers, the asbestos abatement contractor shall make available at each worksite at least four (4) additional uniforms and required respiratory equipment each day for personnel who are authorized to inspect the work site. He/she shall also provide, for the duration of the work at any site involving a decontamination unit for worksite access, a lockable storage locker for use by the Construction Project Manager. In addition to respiratory masks for workers, the asbestos abatement contractor must have on hand at the beginning of each work day, at least four (4) masks each with two sets of fresh filters, for use by personnel who are authorized to inspect the worksite. The asbestos abatement contractor shall check for proper fit of the respirators of all City personnel authorized to enter the Work Area.
- C. Asbestos handlers involved in tent procedures shall wear two (2) disposable suits, including gloves, hood and footwear, and appropriate respiratory equipment. All street clothes shall be removed and stored in a clean room within the work site. The double layer personal protective equipment shall be used for installation of the tent and throughout the procedure, if a decontamination unit (with shower and clean room) is contiguous to the Work Area, only one (1) layer of disposable personal protective equipment shall be required; in this case, prior to exiting the tent the worker shall HEPA vacuum and wet clean the disposable suit.
- D. The outer disposable suit (if 2 suits are worn) shall be removed and remain in the tent upon exiting. Following the tent disposal and work site clean up the workers shall immediately proceed to a shower at the work site. The inner disposal unit and respirator shall be removed in the shower after appropriate wetting. The disposal clothing shall be disposed of as asbestos-containing waste material. The workers shall then fully and vigorously shower with supplied liquid bath soap, shampoo, and clean dry towels.
- E. Coveralls: provide disposable full-body coveralls and disposable head covers. Require that they be worn by all workers in the Work Area. Provide a sufficient number for all required changes for all workers in the Work Area.
- F. Boots: provide work boots with non-skid soles, and where required by OSHA, foot protection, for all workers. Provide boots at no cost to workers. Paint uppers of all boots yellow with waterproof enamel. Do not allow boots to be removed from the Work Area for any reason after being contaminated with ACM and/or dust.
- G. Hard Hats: provide hard hats as required by OSHA for all workers, and provide a minimum of four spares for Inspectors, visitors, etc. Label all hats with same warning label as used on disposal bags. Require hard hats to be worn at all times that work is in progress that may cause potential head injury. Provide hard hats of the type with polyethylene strap suspension. Require hats to remain in the Work

ASBESTOS ABATEMENT

Area throughout the work. Thoroughly clean and decontaminate and bag hard hats prior to removing them from the Work Area at the end of the work.

- H. Goggles: provide eye protection (goggles) as required by OSHA for all workers involved in any activity that may potentially cause eye injury. Require them to be worn at all times during these activities. Thoroughly clean and decontaminate goggles before removing them from the Work Area.
- I. Gloves: provide work gloves to all workers, of the type dictated by the Work and OSHA Standards. Do not remove gloves from the Work Area. Dispose of as asbestos-asbestos contaminated waste at the end of the work. Gloves shall be worn at all times, except during Work Area Preparation activities that do not disturb ACM.
- J. Reusable footwear, hard hats and eye protection devices shall be left in the contaminated Equipment Room until the end of the Asbestos Abatement Work.
- K. Disposable protective clothing shall be discarded and disposed of as asbestos waste every time the wearer exits from the workspace to the outside through the decontamination facility.
- L. Respirators, disposable coveralls, head covers and foot covers shall be provided by the asbestos abatement contractor for the Facilities Representative, Construction Project Manager and any other authorized representative who may inspect the Work Area. Provide two respirators and six respirator filter changes per day.

1.17 AIR MONITORING - ASBESTOS ABATEMENT CONTRACTOR

- A. Asbestos abatement contractor shall employ a qualified industrial hygiene laboratory to analyze air samples in accordance with OSHA Regulations, 1926.1101 (Asbestos Standards for Construction) and New York City regulations.
- B. 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).
- C. Industrial hygiene laboratory shall also be a current proficient participant in the NIST/NVLAP Quality Assurance Program for the identification of bulk samples. Laboratory identification number shall be submitted to and approved by the City.
- D. Air monitoring responsibilities for the asbestos abatement contractor's employees, shall be performed by a representative of the industrial hygiene laboratory retained by the asbestos abatement contractor.

ASBESTOS ABATEMENT

- E. Asbestos abatement contractor shall submit to the City all credentials of the designated (as defined in OSHA 1926.1101) and industrial hygiene laboratory representative for approval.
- F. Air monitoring and inspection shall be conducted by the Asbestos abatement contractor's competent person (as defined in OSHA 1926.1101).
- G. Continuous (daily or per shift) monitoring and inspection will include Work Area samples, personnel samples from the breathing zone of a worker to accurately determine the employees' 8-hour TWA (unless Type C respirators are used) and decontamination unit clean room samples.
- H. Work Area samples and employee personnel samples shall be taken using pumps whose flow rates can be determined to an accuracy of +5-percent, at a minimum of two liters per minute. This must be demonstrated at the job site.
- I. Sampling and analysis methods shall be per NIOSH 7400A.
- J. Test Reports:
 - 1. Promptly process and distribute one copy of the test results, to the Commissioner.
 - 2. Prompt reports are necessary so that if required, modifications to work methods and/or practices may be implemented as soon as possible.
 - 3. Asbestos abatement contractor shall by facsimile notify the Commissioner within 24 hours of the results of each test, followed by written notification within three days.
- K. Competent person shall conduct inspections and provide written reports daily. Inspections will include checking the standard operating procedures, engineering control systems, respiratory protection and decontamination systems, packaging and disposal of asbestos waste, and any other aspects of the project which may affect the health and safety of the people and environment.
- L. All costs for required air monitoring by the asbestos abatement contractor's competent person shall be borne by the asbestos abatement contractor.
- M. The City reserves the right to conduct air and surface dust sampling in conjunction with and separate from the Third-Party Air Monitor for the purposes of Quality Assurance.
- N. All samples shall be accompanied by a Chain of Custody Record that shall be submitted to the Construction Project Manager upon completion of analysis.

1.18 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). This laboratory shall meet the standards stated in Paragraph 1.17. B.
- C. Observations will include, but not be limited to, checking the standard operating procedures, engineering control systems, respiratory protection, decontamination systems, packaging and disposal of asbestos waste, and any other aspects of the project that may affect the health and safety of the environment, Asbestos abatement contractor, and/or facility occupants.
- D. 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.
- E. 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.
- F. At a minimum, air sampling shall be conducted in accordance with the following schedule:

Abatement Activity	Pre-Abatement	During Abatement	Post-Abatement
Equal to or greater than 10,000 square feet or 10,000 linear feet of ACM	PCM	PCM	TEM
Less than 10,000 square feet or 10,000 linear feet of ACM	PCM	PCM	PCM

Note: TEM is acceptable wherever PCM is required.

ASBESTOS ABATEMENT

- G. The number of air samples required per stage of abatement and size of abatement project is listed in the table below:

		Pre-Abatement	During Abatement	Post Abatement
Large Asbestos Projects				
1.	Full Containment	10	5	10
2.	Glovebag inside Tent	5 ^a	5 ^a	5 ^a
3.	Exterior Foam and Vertical Surfaces	-	5 ^c	5 ^d
4.	Interior Foam	10	5 ^c	10 ^d
Small Asbestos Projects				
1.	Full Containment	6	3	6
2.	Glovebag inside Tent	3 ^b	3 ^b	3 ^b
3.	Tent	3 ^b	3 ^b	3 ^b
4.	Exterior Foam and Vertical Surfaces	-	3 ^c	3 ^d
5.	Interior Foam	6	3 ^c	6 ^d
Minor Projects				
1.	Glovebag inside Tent	-	-	1 ^d
2.	Tent	-	-	1 ^d
3.	Exterior Foam and Vertical Surfaces	-	-	1 ^d
4.	Interior Foam	-	-	1 ^d

Notes:

- a. if more than three (3) tents then two (2) samples required per enclosure.
- b. if more than three (3) tents then one (1) sample required per enclosure.
- c. samples shall be taken within the work area(s).
- d. area sampling is required only if:
 - visible emissions are detected during the project
 - during-abatement area sampling results exceeded 0.01 f/cc or the pre-abatement area sampling result(s) for interior projects where applicable.
 - work area to be reoccupied is an interior space at a school, healthcare, or daycare facility.

- H. Prior to commencement of abatement activities, the Third Party Air Monitoring Firm will collect a minimum number of area samples inside each homogeneous work area.

1. Samples will be taken during normal occupancy activities and circumstances at the work site.

ASBESTOS ABATEMENT

2. Samplers shall be located within the proposed work area and at all proposed isolation barrier locations.
 3. Samples shall be analyzed using PCM.
 4. The number of samples to be collected will be determined by the size of the project and the abatement methods to be utilized.
- I. Frequency and duration of the air sampling during abatement shall be representative of the actual conditions during the abatement. The size of the asbestos project will be a factor in the number of samples required to monitor the abatement activities. The following minimum schedule of samples shall be required daily.
1. For large asbestos projects employing full containment, area air sampling shall be performed at the following locations:
 - a. Two area samples outside the work area in uncontaminated areas of the building, remote from the decontamination facilities.
 - (1) Primary location selection shall be within 10 feet of isolation barriers.
 - (2) Where negative ventilation exhaust runs through uncontaminated building areas, one of the area samples will be required in these areas to monitor any potential fiber release.
 - (3) Where exhaust tubes have been grouped together in banks of up to five (5) tubes, with each tube exhausting separately and the bank of tubes terminating together at the same controlled area, one area air sample shall be taken.
 - b. One area sample within the uncontaminated entrance to each decontamination enclosure system.
 - c. Where adjacent non-work areas do not exist, an exterior area sample shall be taken.
 - d. One area sample within 5 feet of the unobstructed exhaust from a negative pressure ventilation system exhausting indoors but not within a duct.
 - e. One area sample outside, but within 25 feet of, the building or structure, if the entire building or structure is the work area.

ASBESTOS ABATEMENT

2. For large asbestos projects involving interior foam method, area air sampling shall be performed at the following sampling locations:
 - a. One area sample taken outside the work area within 10 feet of isolation barriers.
 - b. One area sample taken within the uncontaminated entrance to each worker decontamination and waste decontamination enclosure system.
 - c. One area sample within 5 feet of the unobstructed exhaust from a negative pressure ventilation system exhausting indoors but not within a duct, if applicable.
 - d. Three area samples inside the work area.
 - e. One area sample where the negative ventilation exhaust ducting runs through uncontaminated building areas, if applicable.
3. For large asbestos projects employing the glovebag procedure within a tent, a minimum of five continuous air samples shall be taken concurrently with the abatement for each work area, unless there are more than three enclosures, in which case two area samples per enclosure are required.
 - a. Four area samples taken outside the work area within ten feet of tent enclosure(s).
 - b. One area sample taken within the uncontaminated entrance to each worker and waste decontamination enclosure system.
 - c. One area sample within five feet of the unobstructed exhaust from a negative pressure ventilation system exhausting indoors, but not within a duct, if applicable.
 - d. One area sample where negative ventilation exhaust ducting runs through uncontaminated building areas, if applicable.
4. For large asbestos projects involving exterior foam method or removal of ACM from vertical surfaces, a minimum of five continuous area samples shall be taken concurrently with the abatement for each work area using the following minimum requirements:
 - a. Three area samples inside the work area and remote from the decontamination systems.

ASBESTOS ABATEMENT

- b. One area sample within the uncontaminated entrance to each worker and waste decontamination enclosure system.
 - c. One area sample outside the work area within 25 feet of the building or structure, if the entire building or structure is the work area.
 - d. One area sample inside the building or structure at the egress point to the work area, if applicable.
- 5. For small asbestos projects employing full containment, a minimum of three continuous area samples shall be taken concurrently with the abatement for each work area at the following locations:
 - a. Two area samples taken outside the work area within ten feet of the isolation barriers.
 - b. One area sample within the uncontaminated entrance to each worker or waste decontamination enclosure system.
 - c. One area sample within five feet of the unobstructed exhaust from a negative pressure ventilation system exhausting indoors, but not within a duct, if applicable.
 - d. One area sample where negative ventilation exhaust ducting runs through an uncontaminated building area, if applicable.
- 6. Tent Procedures:

For projects involving more than 25 linear feet or 10 square feet, a minimum of three continuous samples shall be taken concurrently throughout abatement.
- J. Post-abatement clearance air monitoring for projects not solely employing glove-bag procedures shall include a minimum number of area samples inside each homogeneous work area and outside each homogeneous work area (five samples inside/five samples outside for Large Projects and three samples inside/three samples outside for Small Projects). In addition to the five sample inside/five sample outside minimum for Large Projects, one additional representative area sample shall be collected inside and outside the work area for every 5,000 square feet above 25,000 square feet of floor space where ACM has been abated.
- K. Post-abatement clearance air monitoring for Small Projects solely employing glove-bag procedures is not required unless one or more of the following events occurs. In such cases, post-abatement clearance air monitoring procedures shall be followed. The events requiring post-abatement clearance air monitoring are:
 - 1. The integrity of the glove-bag was compromised,

ASBESTOS ABATEMENT

2. Visible emissions are detected outside the glove-bag, and/or
 3. Ambient levels exceed 0.01 f/cc during abatement.
- L. Monitoring requirements for other than post-abatement clearance air monitoring are as follows:
1. The sampling zone for indoor air samples shall be representative of the building occupants' breathing zone.
 2. If possible, outdoor ambient and baseline samplers should be placed about 6 feet above the ground surface in reasonable proximity to the building and away from obstructions and drafts that may unduly affect airflow.
 3. For outdoor samples, if access to electricity and concerns about security dictate a rooftop site, locations near vents and other structures on the roof that would unduly affect airflow shall be avoided.
 4. Air sampling equipment shall not be placed in corners of rooms or near obstructions such as furniture.
 5. Samples shall have a chain of custody record.
- M. Area air sampling during abatement shall be conducted as specified in the following documents except as restricted or modified herein:
1. Measuring Airborne Asbestos Following an Abatement Action, US EPA document 600/4-85-049 (Nov., 1985);
 2. Guidance for Controlling Asbestos-Containing Materials in Buildings; US EPA Publication 560/5-85- 024 (June, 1984);
 3. Methodology for the Measurement of Airborne Asbestos by Electron Microscopy US EPA Contract No. 68-02- 3266;
 4. Mandatory and non-mandatory Electron Microscopy Methods set forth in 40 CFR Part 763, Subpart E, Appendix A.
 5. NIOSH 7400 method using "A" counting rules

ASBESTOS ABATEMENT

- N. In accordance with the above criteria, area samples (see NYCDEP Asbestos Control Program Regulations) shall conform to the following schedule:

Area Samples for Analysis by	Minimum Volume	Flow Rate
PCM, 25mm cassettes	560 liters	5 to 15 liters/minute
TEM, 25mm cassettes	560 liters	1 to 10 liters/minute
TEM, 37mm cassettes	1,250 liters	1 to 10 liters/minute

- O. Post-abatement clearance air monitoring requirements are as follows:

1. Sampling shall not begin until at least one hour after wet cleaning has been completed and no visible pools of water or condensation remain.
2. Samplers shall be placed at random around the work area. If the work area contains the number of rooms equivalent to the number of required samples based on floor area, a sampler shall be placed in each room. When the number of rooms is greater than the required number of samples, a representative sample of rooms shall be selected.
3. The representative samplers placed outside the work area but within the building shall be located to avoid any air that might escape through the isolation barriers and shall be approximately 50 feet from the entrance to the work area, and 25 feet from the isolation barriers.

- P. The following aggressive sampling procedures shall be used within the work area during all clearance air monitoring:

1. Before starting the sampling pumps, use forced air equipment (such as a one horsepower leaf blower) to direct exhaust air against all walls, ceilings, floors, ledges and other surfaces in the work area. This pre-sampling procedure shall take at least five minutes per 1,000 square feet of floor area; then
2. Place a 20-inch diameter fan in the center of the room. Use one fan per 10,000 cubic feet of room space. Place the fan on slow speed and point it toward the ceiling.
3. Start the sampling pumps and sample for the required time or volume.
4. Turn off the pump and then the fan(s) when sampling is completed.

ASBESTOS ABATEMENT

5. Collect a minimum number of area samples inside and outside each homogeneous work area (five inside/five outside samples for Large Projects and three inside/three outside samples for Small Projects). In addition to the minimum for Large Projects, one representative area samples shall be collected inside and outside the work area for every 5,000 square feet above 25,000 square feet of floor space where ACM has been abated.

Q. For post-abatement monitoring, area samples shall conform to the following schedule:

Area Samples for Analysis by	Minimum Volume	Flow Rate
PCM	1,800 liters	5 to 15 liters/minute
TEM	1,250 liters	1 to 10 liters/minute

1. Each homogeneous work area that does not meet the clearance criteria shall be thoroughly re-cleaned using wet methods, with the negative pressure ventilation system in operation. New samples shall be collected in the work area as described above. The process shall be repeated until the work site meets the clearance criteria.
2. For an asbestos project with more than one homogeneous work area, the release criterion shall be applied independently to each work area.
3. Should airborne fiber concentrations exceed the clearance criteria, the asbestos abatement contractor shall re-clean the work area utilizing wet wiping and HEPA-vacuumping techniques. Following completion of re-cleaning activities, the Third-Party Air Monitor will perform an observation of the Work Area. If the Third-Party Air Monitor determines that the work was performed in accordance with the specifications, the appropriate settling period will be observed and additional air sampling will be performed.
4. All costs resulting from additional air tests and observations shall be borne by the asbestos abatement contractor. These costs may include, but are not limited to, labor, analysis fees, materials, and expenses.
5. After the area has been found to be in compliance, the asbestos abatement contractor may remove Isolation Barriers and perform final cleaning as specified.

R. Clearance and/or Re-occupancy Criteria:

1. The clearance criteria shall be applied to each homogeneous work area independently.

ASBESTOS ABATEMENT

2. For PCM analysis, the clearance air monitoring shall be considered satisfactory when each of the 5 inside/5 outside samples for Large Projects and/or 3 inside/3 outside samples for Small Projects is less than or equal to 0.01 f/cc or the background concentrations, whichever is greater.
3. For TEM analysis, the clearance air monitoring shall be considered satisfactory when the requirements stated in 40 CFR Part 763, Subpart E, Appendix A, Section IV are met.
4. As soon as the air monitoring tests are completed, the Third-Party Air Monitor will send the results of such tests to the City and notify the Asbestos abatement contractor.
5. The asbestos abatement contractor shall initiate the appropriate closeout information into the DEP ARTS database within 24 hours of work area completion to allow the Third Party Air Monitoring Firm to complete and submit the ACP-15 forms for each specific work area.
6. The asbestos abatement contractor shall provide the ACP-20 and ACP-21 forms to the Third Party Air Monitoring Firm within 48 hours of receipt.

1.19 TAMPERING WITH TEST EQUIPMENT

All parties to this Contract are hereby notified that any tampering with testing equipment will be considered an attempt at falsifying reports and records to federal and state agencies and each offense will be prosecuted under applicable state and federal criminal codes to the fullest extent possible.

1.20 GUARANTEE

- A. Work performed in compliance with this Contract shall be guaranteed for a period of one year from the date the completed work is accepted by the City.
- B. The asbestos abatement contractor shall not be held liable for the guarantee where the repair required under the guarantee is a result of obvious abuse or vandalism, as determined by the Commissioner.
- C. The City will notify the asbestos abatement contractor in writing regarding defects in work under the guarantee.

PART 2 – PRODUCTS

2.01 MATERIAL HANDLING

- A. Deliver all materials to the job site in their manufacturer's original container, with the manufacturer's label intact and legible.

ASBESTOS ABATEMENT

1. Maintain packaged materials with seals unbroken and labels intact until time of use.
 2. Store all materials on pallets, away from any damp and/or wet surface. Cover materials in order to prevent damage and/or contamination.
 3. Promptly remove damaged materials and unsuitable items from the job site, and promptly replace with material meeting the specified requirements, at no additional cost to the City.
- B. The Construction Project Manager may reject as non-complying such material and products that do not bear identification satisfactory to the Construction Project Manager as to manufacturer, grade, quality and other pertinent information.

2.02 MATERIALS

- A. Wetting agents: (Surfactant) shall consist of resin materials in a water base, which have been tested to ensure materials are non-toxic and non-hazardous. Surfactants shall be installed according to the manufacturer's written instructions.
- B. Encapsulants: Liquid material which can be applied to asbestos-containing material which temporarily controls the possible release of asbestos fibers from the material or surface either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components together (penetrating encapsulant). A thin coat of lockdown encapsulant shall be applied to all surfaces in the work area which were not the subject of removal or abatement, including the cleaned layer of the surface barriers, but excepting sprinklers, standpipes, and other active elements of the fire suppression system.
- C. During abatement activities, replacement materials shall be stored outside the work area in a manner to prevent contamination. Materials required for the asbestos project (i.e., plastic sheeting, replacement filters, duct tape, etc.) shall be stored to prevent damage or contamination.
- D. Framing Materials and Doors: As required to construct temporary decontamination facilities and isolation barriers. Lumber shall be high grade, new, finished one side and fire retardant.
- E. Fire Retardant Polyethylene Sheeting: minimum uniform thickness of 6-mil. Provide largest size possible to minimize seams. All materials used in the construction of temporary enclosures shall be noncombustible or fire-retardant in accordance with NFPA 701 and 255.
- F. Fire Retardant Reinforced Polyethylene Sheeting: For covering floor of decontamination units, provide translucent, nylon reinforced or woven polyethylene laminated, fire retardant polyethylene sheeting. Provide largest size possible to minimize seams, minimum uniform thickness 6-mil. All materials used

ASBESTOS ABATEMENT

in the construction of temporary enclosures shall be noncombustible or fire-retardant in accordance with NFPA 701 and 255.

- G. Drums: Asbestos-transporting drums, sealable and clearly marked with warning labels as required by OSHA and EPA.
- H. Polyethylene Disposal Bags: Asbestos disposal bags, minimum of fire retardant 6-mil thick. Bags shall be clearly marked with warning labels as required by OSHA and EPA.
- I. Signs: Asbestos warning signs for posting at perimeter of Work Area, as required by OSHA and EPA.
- J. Waste Container Bag Liners and Flexible Trailer Trays: One piece leak-resistant flexible tray with absorbent pad.
- K. Tape: Provide tape which is of high quality with an adhesive that is formulated to aggressively stick to sheet polyethylene.
- L. Spray Adhesive: Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.
- M. Flexible Duct: Spiral reinforced flex duct for air filtration devices.
- N. Protective Clothing: Workers shall be provided with sufficient sets of properly fitting, full-body, disposable coveralls, head covers, gloves, and 18-inch high boot-type foot covers. Protective clothing shall conform to OSHA Standard 29 CFR 1926.1101.
- O. Surfactants, strippers, sealers, or any other chemicals used shall be non-carcinogenic and non-toxic.
- P. Materials used in the construction of temporary enclosures shall be noncombustible or fire-retardant in accordance with NFPA 701 and 255.

2.03 TOOLS AND EQUIPMENT

- A. Air Filtration Device (AFD): AFDs shall be equipped with High Efficiency Particulate Air (HEPA) filtration systems and shall be approved by and listed with Underwriter's Laboratory.
- B. Scaffolding: All scaffolding shall be designed and constructed in accordance with OSHA (29 CFR 1926/1910), New York City Building Code, and any other applicable federal, state and local government regulations. Whenever there is a conflict or overlap of the above references the most stringent provisions are applicable. All scaffolding and components shall be capable of supporting without failure a minimum of four times the maximum intended load, plus an allowance

ASBESTOS ABATEMENT

for impact. All scaffolding and staging must be certified in writing by a Professional Engineer licensed to practice in the State of New York.

1. Equip rungs of all metal ladders, etc., with an abrasive, non-slip surface.
 2. Provide non-skid surface on all scaffold surfaces subject to foot traffic. Scaffold ends and joints shall be sealed with tape to prevent penetration of asbestos fibers.
- C. Transportation Equipment: Transportation Equipment, as required, shall be suitable for loading, temporary storage, transit and unloading of asbestos contaminated waste without exposure to persons or property. Any temporary storage containers positioned outside the building for temporary storage shall be metal, closed and locked.
- D. Vacuum Equipment: All vacuum equipment utilized in the Work Area shall utilize HEPA filtration systems.
- E. Vacuum Attachments: Soft Brush Attachment, Asbestos Scraper Tool, Drill Dust Control Kit.
- F. Electric Sprayer: An electric airless sprayer suitable for application of encapsulating material and shall be approved by and listed with Underwriters Laboratory.
- G. Water Sprayer: The water sprayer shall be an airless or other low-pressure sprayer for amended water application.
- H. Water Atomizer: Powered air-misting device equipped with a ground fault interrupter and equipped to operate continuously.
- I. Brushes: All brushes shall have nylon bristles. Wire brushes are excluded from use due to their potential to shred asbestos fibers into small, fine fibers. Wire brushes maybe used for cleaning pipe joints within glove-bags upon written approval of the Construction Project Manager.
- J. Power tools used to drill, cut into, or otherwise disturb ACM shall be manufacturer-equipped with HEPA filtered local exhaust ventilation. Abrasive removal methods, including the use of beadblasters, are prohibited.
- K. Other Tools and Equipment: Asbestos abatement contractor shall provide other suitable tools for the stripping, removal, encapsulation, and disposal activities including but not limited to: hand-held scrapers, sponges, rounded-edge shovels, brooms, and carts.

ASBESTOS ABATEMENT

- L. Fans and Leaf Blower: Provide Leaf Blower (one leaf blower per floor) and one 20-inch diameter fans for each 10,000 cubic feet of Work Area volume to be used for aggressive sampling technique for clearance air testing.
- M. Fire Extinguishers: At least one fire extinguisher with a minimum rating 2-A:10-B:C shall be required for each work place. In the case of large asbestos projects, at least two such fire extinguishers shall be required.
- N. First Aid Kits: Asbestos abatement contractor shall maintain adequately stocked first aid kits in the clean rooms of the decontamination units and within Work Areas. The first aid kit shall be approved by a licensed physician for the work to be performed under this Contract.
- O. Water Service:
 - 1. Temporary Water Service Connection: All connections to the Facilities water system shall include back flow protection. Valves shall be temperature and pressure rated for operation of the temperature and pressures encountered. After completion of use, connections and fittings shall be removed without damage or alteration to existing water piping, and equipment. Leaking or dripping fittings/valves shall be repaired and or replaced as required.
 - 2. Water Hoses: Employ new heavy-duty abrasion-resistant hoses with a pressure rating greater than the maximum pressure of the water distribution system to provide water into each Work Area and to each Decontamination Enclosure Unit. Provide fittings as required for connection to existing wall hydrants or spouts, as well as temporary water heating equipment, branch piping, showers, shut-off nozzles and equipment.
 - 3. Water Heater: Provide UL rated 40-gallon electric water heaters to supply hot water for Personal Decontamination Enclosure System Shower. Activate from 30 Amp Circuit breakers located within the Decontamination Enclosure sub panel. Provide relief valve compatible with water heater operations, pipe relief valve down to drip pan at floor level with type 'L' copper piping. Drip pans shall be 6-inch deep and securely fastened to water heater. Wiring of the water heater shall comply with NEMA, NECA, and UL standards.
- P. Electrical Service:
 - 1. General: Comply with applicable NEMA, NECA and UL standards and governing regulations for materials and layout of temporary electric service.
 - 2. Temporary Power: Provide service to decontamination unit sub panel with minimum 60 AMP, two pole circuit breaker or fused disconnect connected to the building's main distribution panel. Sub panel and disconnect shall be

ASBESTOS ABATEMENT

sized and equipped to accommodate all electrical equipment required for completion of the work.

3. Voltage Differences: Provide identification warning signs at power outlets that are other than 110-120 volt power. Provide polarized outlets for plug-in type outlets, to prevent insertion of 110-120 volt plugs into higher voltage outlets. Dry type transformers shall be provided where required to provide voltages necessary for work operations.
4. Ground Fault Protection: Equip all circuits for any purpose entering Work Area with ground fault circuit interrupters (GFCI). Locate the GFCIs outside the Work Area so that all circuits are protected prior to entry to Work Area. Provide circuit breaker type ground fault circuit interrupters (GFCI) equipped with test button and reset switch for all circuits to be used for any purpose in Work Area, decontamination units, exterior, or as otherwise required by NEC, OSHA or other authority.
5. Power Distribution System: Provide circuits of adequate size and proper characteristics for each use. In general run wiring overhead, and rise vertically where wiring will be least subject to damage from operations.
6. Temporary Wiring: In the Work Area shall be type UF non-metallic sheathed cable located overhead and exposed for surveillance. Provide liquid tight enclosures or boxes for all wiring devices. Do not wire temporary lighting with plain, exposed (insulated) electrical conductors.
7. Electrical Power Cords: Use only grounded extension cords; use hard service cords where exposed to traffic and abrasion. Use single lengths of cords only.
8. Temporary Lighting: All lighting within the Work Area shall be liquid and moisture proof and designed for the use intended.
 - a. Provide sufficient temporary lighting to ensure proper workmanship everywhere; by combined use of daylight, general lighting, and portable plug-in task lighting.
 - b. Provide lighting in the Decontamination Unit as required to supply a minimum 50-foot candle light level.
9. If electrical circuits, machinery, and other electrical systems in or passing through the work area must stay in operation due to health and safety requirements, the following precautions must be taken:
 - a. All unprotected cables, except low-voltage (less than 24 volts) communication and control system cables, panel boxes of cables and joints in live conduit that run through the work area shall be covered

ASBESTOS ABATEMENT

with three (3) independent layers of six (6) mil fire retardant polyethylene. Each layer shall be individually duct taped and sealed. All three (3) layers of polyethylene sheeting shall be left in place until satisfactory clearance air sampling results have been obtained.

2.04 CLEANING

- A. Throughout the construction period, the asbestos abatement contractor shall maintain the building as described in this Section.
 - 1. The asbestos abatement contractor shall prevent building areas other than the Work Area from becoming contaminated with asbestos-containing dust or debris. Should areas outside the Work Area become contaminated with asbestos-containing dust or debris as a consequence of the asbestos abatement contractor's work practices, the asbestos abatement contractor shall be responsible for cleaning these areas in accordance with the procedures appended in Title 15, Chapter 1 of RCNY and NYSDOL ICR56. All costs incurred in cleaning or otherwise decontaminating non-Work Areas and the contents thereof shall be borne by the asbestos abatement contractor at no additional cost to the City.
 - 2. The asbestos abatement contractor shall provide to all personnel and laborers the required equipment and materials needed to maintain the specified standard of cleanliness.
- B. General
 - 1. Waste water from asbestos removal operations, including shower water, may be discharged into the public sewer system only after approved filtration is on operation to remove asbestos fibers.
 - 2. Asbestos wastes shall be double bagged in six mil (.006") fire retardant polyethylene bags approved for ACM disposal and shall be properly labeled and handled before disposal.
 - 3. All waste generated shall be bagged, wrapped or containerized immediately upon removal. The personal and waste decontamination enclosure systems and floor and scaffold surfaces shall be HEPA vacuumed and wet cleaned at the end of each work shift at a minimum.
 - 4. The asbestos abatement contractor shall use corrugated cartons or drums for disposal of asbestos-containing waste having sharp edged components (e.g., nails, screws, metal lathe and tin sheeting) that may tear polyethylene bags and sheeting. The waste within the drums or cartons must be double bagged.

ASBESTOS ABATEMENT

5. The asbestos abatement contractor shall transport all bags of waste to disposal site in thirty gallon capacity metal or fiber drums with tight lids, or in locked steel dumpster.
6. Dumping of debris, waste or bagged waste will not be permitted.
7. The waste decontamination enclosure system shall be wet cleaned twice using wet cleaning methods upon completion of waste removal. When the worker decontamination enclosure shower room alternates as a waste container wash room, the shower room shall be washed immediately with cloths or mops saturated with a detergent solution prior to wet cleaning.
8. Excessive water accumulation or flooding in the work area shall require work to stop until the water is collected and disposed of properly.
9. ACM shall be collected utilizing rubber dust pans and rubber squeegees.
10. HEPA vacuums shall not be used on wet materials unless specifically designed for that purpose.
11. Metal shovels shall not be used within the work area.
12. Mastic solvent when used will be applied in moderation (e.g., by airless sprayer). Saturation of the concrete floor with mastic solvent must be avoided.
13. The asbestos abatement contractor shall retain all items in the storage area in an orderly arrangement allowing maximum access, not impeding traffic, and providing the required protection of all materials.
14. The asbestos abatement contractor shall not allow accumulation of scrap, debris, waste material, and other items not required for use in this work. When asbestos contaminated waste must be kept on the work site overnight or longer, it shall be double bagged and stored in accordance with New York City Department of Sanitation (NYCDOS) regulation Title 16 Chapter 8, and Federal, State and City laws.
15. At least twice a week (more if necessary), the asbestos abatement contractor shall completely remove all scrap, debris and waste material from the job site.
16. The asbestos abatement contractor shall provide adequate storage space for all items awaiting removal from the job site, observing all requirements for fire protection and concerns for the environment.
17. All respiratory protection equipment shall be selected from the latest NIOSH Certified Equipment list.

ASBESTOS ABATEMENT

18. Daily and more often, if necessary, the asbestos abatement contractor shall inspect the Work Areas and adjoining spaces, and pick up all scrap, debris, and waste material. All such items shall be removed to the place designated for their storage.
19. Weekly, and more often, if necessary, the asbestos abatement contractor shall inspect all arrangements of materials stored on the site; re-stack and tidy them or otherwise service them to meet the requirements of these Specifications.
20. The asbestos abatement contractor shall maintain the site in a neat and orderly condition at all times.

PART 3 – EXECUTION

3.01 WORKER DECONTAMINATION FACILITY

A. Large Asbestos Projects (Small Project Option):

1. Provide a worker decontamination facility in accordance with, Title 15, Chapter 1, OSHA Standard 29 CFR 1926.1101, 12NYCRR Part 56 and as specified herein. Unless approved by NYCDEP and the City, worker decontamination facilities shall be attached to the Work Areas
 - a. Structure:
 - (1) Use modular systems or build using wood or metal frame studs, joists, and rafters placed at a maximum of 16 inches on-center.
 - (2) When worker decontamination unit is located outdoors, in areas with public access, or in correctional facilities, frame work shall be lined with minimum 3/8" thickness fire rated plywood sheathing. Sheathing shall be caulked or taped airtight at all joints and seams.
 - (3) Interior shall be covered with two layers of fire retardant 6-mil polyethylene sheeting, with a minimum overlap of 12 inches at seams. Seal seams airtight using tape and adhesive. The interior floor shall be covered with two (2) layers of reinforced fire-retardant polyethylene sheeting with a minimum overlap on the walls of twelve inches.
 - (4) Entrances to the decontamination unit shall be secured with lockable hinged doors. Doors shall be open at all times when abatement operations are in progress. Doors shall be louvered

ASBESTOS ABATEMENT

to allow for air movement through the decontamination units into Work Area.

- b. Curtained Doorways: A device to allow ingress or egress from one room to another while permitting minimal air movement between the rooms.
- c. Air Locks: Air locks shall consist of two curtained doorways placed a minimum of three feet apart.
- d. Decontamination Enclosure System shall be placed adjacent to the Work Area and shall consist of three totally enclosed chambers, separated from Work Area and each other by airlocks, as follows:
 - (1) Equipment Room: The equipment room shall have a curtain doorway to separate it from the Work Area, and share a common airlock with the shower room. The equipment room shall be large enough to accommodate at least one worker (allowing them enough room to remove their protective clothing and footwear), and a fire retardant 6-mil disposal bag for collection of discarded clothing and equipment. The equipment room shall be utilized for the storage of equipment and tools after decontamination using a HEPA-vacuum and/or wet cleaning. A one-day supply of replacement filters, in sealed containers, for HEPA-vacuums and negative air machines, extra tools, containers of surfactant, and other materials and equipment required for the project shall be stored here. A walk-off pan filled with water shall be placed in the Work Area just outside the equipment room for persons to clean foot coverings when leaving the Work Area. Contaminated footwear and reusable work clothing shall be stored in this room.
 - (2) Shower Room: The shower room shall have two airlocks (one that separates it from the equipment room and one that separates it from the clean room). The shower room shall contain at least one shower, with hot and cold water adjustable at the tap, per six workers. Careful attention shall be given to the shower to ensure against leaking of any kind and shall contain a rigid catch basin at least six inches deep. Asbestos abatement contractor shall supply towels, shampoo and liquid soap in the shower room at all times. Shower water shall be continuously drained, collected, and filtered through a system with at least a 5-micron particle size collection capacity. A system containing a series of several filters with progressively smaller pore sizes shall be used to avoid rapid clogging of the filters by large particles. Pumps shall be installed, maintained

ASBESTOS ABATEMENT

and utilized in accordance with manufacturer's recommendations. Filtered water shall be discharged in accordance with applicable codes. Contaminated filters shall be disposed of as asbestos waste.

- (3) Clean Room: The clean room shall share a common airlock with the shower room and shall have a curtained doorway to separate it from outside non-contaminated areas. Lockers, for storage of workers' street clothing, and shelves, for storing respirators, shall be provided in this area. Clean disposable clothing, replacement filters for respirators, and clean dry towels shall be provided in the clean room. The clean room shall not be used for the storage of tool, equipment or other materials.

B. Small Asbestos Projects:

1. Provide a worker decontamination facility in accordance with, Title 15, Chapter 1, OSHA Standard 29 CFR 1926.1101, 12NYCRR Part 56 and as specified herein. Unless approved by NYCDEP and the City, worker decontamination facilities shall be attached to the Work Areas.
2. The worker decontamination enclosure system shall consist of, as a minimum, an equipment room, a shower room, and a clean room separated from each other and from the work area by curtained doorways. The equipment storage, personnel gross decontamination and removal of disposal clothing shall occur in the equipment room prior to entering the shower. All other requirements shall be the same as described above for a large asbestos project.
3. For small asbestos projects with only one exit from the work area, the shower room may be used as a waste washroom. The clean room shall not be used for waste storage. All other requirements shall be the same as described above for a large asbestos project.

- C. Decontamination Enclosure System Utilities: Lighting, heat, and electricity shall be provided as necessary by the Asbestos abatement contractor, and as specified herein.

3.02 WASTE DECONTAMINATION FACILITY

A. Large Asbestos Project (Small Project Option)

1. Provide a worker decontamination facility in accordance with, Title 15, Chapter 1, OSHA Standard 29 CFR 1926.1101, 12NYCRR Part 56 and as specified herein. Unless approved by NYCDEP and the City, worker decontamination facilities shall be attached to the Work Areas.

ASBESTOS ABATEMENT

a. Structure:

- (1) Use modular systems or build using wood or metal frame studs, joists, and rafters placed at a maximum of 16 inches on-center.
- (2) When worker decontamination unit is located outdoors, in areas with public access, or in correctional facilities, frame work shall be lined with minimum 3/8" thickness fire rated plywood sheathing. Sheathing shall be caulked or taped airtight at all joints and seams.
- (3) Interior walls shall be covered with two layers of fire retardant 6-mil polyethylene sheeting, with a minimum overlap of 12 inches at seams. Seal seams airtight using tape and adhesive. The interior floor shall be covered with two (2) layers of reinforced fire-retardant polyethylene sheeting with a minimum overlap on the walls of twelve inches.
- (4) Entrances to the decontamination unit shall be secured with lockable hinged doors. Doors shall be open at all times when abatement operations are in progress. Doors shall be louvered to allow for air movement through the decontamination units into the Work Area.

b. Curtained Doorways: A device to allow ingress or egress from one room to another while permitting minimal air movement between the rooms.

c. Air Locks: Air locks shall consist of two curtained doorways placed a minimum of three feet apart.

d. Decontamination Enclosure System shall be located outside the work area and attached to all locations through which ACM waste will be removed from the work area and shall consist of two totally enclosed chambers, separated from the Work Area and each other by airlocks, as follows:

- (1) Washroom: An equipment washroom shall have two air locks (one separating the unit from the Work Area and one common air lock that separates it from the holding area). The washroom shall have facilities for washing material containers and equipment. Gross removal of dust and debris from contaminated material containers and equipment shall be accomplished in the Work Area, prior to moving to the washroom.

ASBESTOS ABATEMENT

- (2) Holding Area: A holding area shall share a common air lock with the equipment washroom and shall have a curtained doorway to outside areas. A hinged, lockable door shall be placed at the holding area entrance to prevent unauthorized access into the Work Area.

B. Small Asbestos Project:

1. The worker decontamination enclosure system shall consist of, as a minimum, an equipment room, a shower room, and a clean room separated from each other and from the work area by curtained doorways. The equipment storage, personnel gross decontamination and removal of disposal clothing shall occur in the equipment room prior to entering the shower. All other requirements shall be the same as described above for a large asbestos project.
2. For small asbestos projects with only one exit from the work area, the shower room may be used as a waste washroom. The clean room shall not be used for waste storage. All other requirements shall be the same as described above for a large asbestos project.

- C. Decontamination Enclosure System Utilities: Lighting, heat, and electricity shall be provided as necessary by the Asbestos abatement contractor, and as specified herein.

3.03 PERSONNEL ENTRANCE AND DECONTAMINATION PROCEDURES FOR REMOVAL OPERATIONS UTILIZING REMOTE DECONTAMINATION FACILITIES

- A. All individuals who enter the Work Area shall sign the entry log, located in the clean room, upon each entry and exit. The log shall be permanently bound and shall fully identify the facility, agents, asbestos abatement contractor(s), the project, each Work Area, and worker respiratory protection employed. The job supervisor shall be responsible for the maintenance of the log during the abatement activity. The log shall be submitted to the NYC DDC within 48 hours of request.
- B. Each worker shall remove street clothes in the clean room; wear two disposable suits, including gloves, hoods and non-skid footwear; and put on a clean respirator (with new filters) before entering the Work Area.
- C. Each worker shall, before leaving the Work Area or tent, clean the outside of the respirators and outer layer of protective clothing by wet cleaning and/or HEPA-vacuuming. The outer disposable suit shall be removed in the airlock prior to proceeding to the Worker Decontamination Unit. The inner disposable suit and respirator shall be wet wiped and HEPA vacuumed thoroughly before removing and prior to aggressive shower.

- D. Following showering and drying off, each worker or authorized visitor shall proceed directly to the clean room, dress in street clothes, and exit the decontamination enclosure system immediately.

3.04 PERSONNEL ENTRANCE AND DECONTAMINATION PROCEDURES FOR REMOVAL OPERATIONS UTILIZING ATTACHED DECONTAMINATION FACILITIES

- A. All workers and authorized visitors shall enter the Work Area through the worker decontamination facility.
- B. All individuals who enter the Work Area shall sign the entry log, located in the clean room, upon each entry and exit. The log shall be permanently bound and shall identify fully the facility, agents, asbestos abatement contractor(s), the project, each Work Area and worker respiratory protection employed. The site supervisor shall be responsible for the maintenance of the log during the abatement activity. The log shall be submitted to the NYC DDC within 48 hours of request.
- C. Each worker or authorized visitor shall, upon entering the job site, remove street clothes in the clean room and put on a clean respirator with filters, and clean protective clothing before entering the Work Area through the shower room and equipment room.
- D. Each worker or authorized visitor shall, each time he leaves the Work Area, remove gross contamination from clothing before leaving the Work Area; proceed to the equipment room and remove clothing except the respirator; still wearing the respirator, proceed to the shower room; clean the outside of the respirator with soap and water while showering; remove filters, wet them, and dispose of them in the container provided for that purpose; wash and rinse the inside of the respirator; and thoroughly shampoo and wash himself/herself.
- E. Following showering and drying off, each worker or authorized visitor shall proceed directly to the clean room, dress in street clothes, and exit the decontamination enclosure system immediately. Disposable clothing of the type worn inside the Work Area is not permitted outside the Work Area.

3.05 MAINTENANCE OF DECONTAMINATION ENCLOSURE FACILITIES AND BARRIERS

The following procedures shall be followed during abatement activities.

- A. All polyethylene barriers inside the work place and partitions constructed to isolate the Work Area from occupied areas shall be inspected by the asbestos handler supervisor at least twice per shift.

ASBESTOS ABATEMENT

- B. Smoke tubes shall be used to test the integrity of the Work Area barriers and the decontamination enclosure systems daily before abatement activity begins and at the end of each shift.
- C. Damage and defects in the decontamination enclosure system shall be repaired immediately upon discovery. The decontamination enclosure system shall be maintained in a clean and sanitary condition at all times.
- D. At any time during the abatement activity, if visible emissions are observed, or elevated asbestos fiber counts outside the Work Area are measured, or if damage occurs to barriers, abatement shall stop. The source of the contamination shall be located, the integrity of the barriers shall be restored and extended to include the contaminated area, and visible residue shall be cleaned up using appropriate HEPA-vacuuming and wet cleaning.
- E. Inspections and observations shall be documented in the daily project log by the asbestos handler supervisor.
- F. The daily inspection to ensure that exits have been checked against exterior blockage or impediments to exiting shall be documented in the log book. If exits are found to be blocked, abatement activities shall stop until the blockage is cleared.

3.06 MODIFICATIONS TO HVAC SYSTEMS

- A. Shut down, isolate or seal, all existing HVAC units, fans, exhaust fans, perimeter convection air units, supply and/or return air ducts, etc., situated in, traversing or servicing the work zone.
- B. Seal all seams with duct tap. Wrap entire duct with a minimum of two layers of fire retardant 6-mil polyethylene sheeting. All shutdowns are to be coordinated with the Facility. Where systems must be maintained, i.e., traversing Work Areas to non-Work Areas, only supply ducts will be maintained, protect as described above. All returns must be blanked off in Work Area and adjacent areas, including floor above and below Work Area. When required Asbestos abatement contractor shall apply for a clarification from NYCDEP. The Asbestos abatement contractor shall implement the following engineering procedures:
 - 1. Maintenance of a positive pressure within the HVAC system of 0.01 inch water gauge (or greater) with respect to the ambient pressure outside the Work Area. The conditions for this system shall be maintained and be operational 24 hours per day from the initiation of Work Area preparation until successful final air clearance. Positive pressurization of HVAC system shall be applied only under the direction and control of professional engineer, or other knowledgeable licensed professional;

ASBESTOS ABATEMENT

2. The positive pressurization of the duct shall be tested, inspected and recorded both at the beginning and at the end of each shift;
 3. The positive pressurization shall be monitored using instrumentation which will provide a written record of pressurization and that will trigger an audible alarm, if the static pressure falls below the set value;
 4. The supply air fan and the supply air damper for the active positive-pressurized duct shall be placed in the manual "on" positions to prevent shutdown by fail-safe mechanisms;
 5. The return air fan and the return air dampers shall be shut down and locked-out;
 6. All the seams of the HVAC ducts that pass through the Work Area shall be sealed;
 7. The HVAC ducts that pass through the Work Area shall be covered with two (2) layers of fire retardant 6-mil polyethylene sheeting, and all seams and edges of both layers shall be sealed airtight;
 8. The supply air fans, return air fans, and all dampers servicing the Work Area itself shall be shut down and locked-out. All openings within the Work Area of supply and return air ducts shall be sealed with 3/8-inch fire rated plywood and two layers of fire retardant 6-mil polyethylene;
 9. When abatement occurs during periods while the HVAC system is shut down an alternative method of pressurization of the duct passing through the Work Area should be employed (e.g., by low-pressure "blowers", etc., directly coupled into the duct). Item #4 above shall be deleted and shall be replaced by the requirement to set the dampers of the HVAC duct in the manual closed positions, in order to effect pressurization.
- C. Asbestos abatement contractor to coordinate this item with the Facility and Construction Project Manager at the commencement of work. Where present HVAC systems (ducts) service an area and that air system cannot be shut down, asbestos abatement contractor shall isolate and seal the ducts, both supply and return, at the boundary of that zone.
1. To isolate, cap, or seal a duct, the asbestos abatement contractor shall remove insulation from duct (if necessary), then disconnect linkage to fold shut all fire dampers. Asbestos abatement contractor shall seal all edges and seams with caulk and duct-tape.
 2. Asbestos abatement contractor shall then cut existing duct and fold metal in and secure with approved fasteners. Asbestos abatement contractor shall caulk and duct-tape all seams and edges.

ASBESTOS ABATEMENT

3. All ducts shall then be completely wrapped and sealed with duct-tape and three (3) layers of reinforced polyethylene sheeting.
 4. All ducts shall be restored to original working order at the end of the project.
- D. Where present HVAC systems (ducts) service occupied areas (non-Work Areas), the Asbestos abatement contractor shall blank off the ducts.
1. To isolate or seal the return duct, the asbestos abatement contractor shall remove any insulation (if necessary) from the duct. Then disconnect linkage to fold shut all fire dampers and insert a fiberglass board within the duct. Asbestos abatement contractor shall seal all edges and seams with caulk, duct-tape and three (3) layers of reinforced polyethylene sheeting.
 2. All isolation of return ducts and any other activity that requires removal of ceiling by the asbestos abatement contractor shall be conducted under controls. Work is to be coordinated with the Construction Project Manager and the Facility and is described as follows:
 - a. Work shall occur as scheduled.
 - b. Horizontal surfaces near the blanking operations shall be protected with fire retardant 6-mil polyethylene sheeting.
 - c. Plastic drapes shall be used to enclose the immediate area.
 - d. Asbestos abatement contractor to position and operate air filtration devices and HEPA-vacuums in the area to clean space after blanking operations.
 - e. All personnel involved with this work shall receive personal protection (i.e., respirators and disposable suits).
- E. Upon loss of negative pressure or electric power, all work activities in an area shall cease immediately and shall not resume until negative pressure and/or electric power has been fully restored. When a power failure or loss of negative pressure lasts, or is expected to last, longer than thirty (30) minutes, the following sequence of events shall occur.
1. All make up air inlets shall be sealed airtight.
 2. All decontamination facilities shall be sealed airtight after evacuation of all personnel from the Work Area.
 3. All adjacent areas shall be monitored for potential fiber release upon discovery of and subsequently throughout, power failure.

3.07 LOCKOUT OF HVAC SYSTEMS, ELECTRIC POWER, AND ACTIVE BOILERS

Prior to the start of any prep work, the asbestos abatement contractor shall employ skilled tradesmen with limited asbestos licenses for the following work:

- A. Disable all ventilating systems or other systems bringing air into or exhausting air out of the Work Area. Disable system by disconnecting wires removing circuit breakers, by lockable switch or other positive means to ensure against accidental re-starting of equipment.
- B. Lock out power to the Work Area by switching off all breakers and removing them from panels or by switching and locking entire panel. Label panel with following notation: "DANGER CIRCUIT BEING WORKED ON". Give all keys to Facility.
- C. Lock out power to circuits running through Work Area whenever possible by switching off and removing breakers from panel. If circuits must remain live, the Facility shall notify asbestos abatement contractor in order that he may secure a variance from NYCDEP. The asbestos abatement contractor shall protect all conduit and wires to remain and label all active circuits at intervals not to exceed 3 feet with tags having the following notation: "DANGER LIVE ELECTROCUTION HAZARD". The asbestos abatement contractor shall label all circuits in all locations including hidden locations that may be affected by the work in a similar manner.
- D. All boilers and other equipment within the work area shall be shut down, locked out, tagged out and the burner/boiler/equipment accesses and openings shall be sealed until abatement activities are complete. If the boiler or other exhausted equipment will be subject to abatement, all breeching, stacks, columns, flues, shafts, and double-walled enclosures serving as exhausts or vents shall be segregated from the affected boiler or equipment and sealed airtight to eliminate potential chimney effects within the work area.

PART 4 – PREPARATION OF WORK AREA AND REMOVAL PROCEDURES

4.01 REMOVAL OF ASBESTOS-CONTAINING MATERIAL

A. Asbestos abatement contractor Responsibility

Asbestos abatement contractor shall be responsible for the proper removal of ACM from the Work Area using standard industry techniques. The Third-Party Air Monitor representative shall observe the Work.

1. General Requirements:

ASBESTOS ABATEMENT

- a. Removal of ACM shall be performed using wet methods. Dry removal of ACM is prohibited.
- b. Spray ACM with amended water with sufficient frequency and quantity to enhance penetration. Sufficient time shall be allowed for amended water to penetrate the material to the substrate prior to removal. All ACM shall be thoroughly wetted while work is being conducted.
- c. Accumulation of standing water on the floor of the Work Area is prohibited.
- d. Apply removal encapsulants, when used, in accordance with the manufacturer's recommendations and guidelines.
- e. Containerize ACM immediately upon detachment from the substrate. Alternately, ACM may be dropped in to a flexible catch basin and promptly bagged. Detached ACM is not permitted to lie on the floor for any period of time. Excess air within the bag shall be removed before sealing. ACM shall not be dropped from a height of greater than 10 feet. Above 10 feet, dust free inclined chutes may be used. Maximum inclination from horizontal shall be 60-degrees for all chutes.
- f. Exits from the work area shall be maintained, or alternative exits shall be established, in accordance with section 1027 of the New York City Fire Code. Exits shall be checked at the beginning and end of each work shift against blockage or impediments to exiting.
- g. Signs clearly indicating the direction of exits shall be maintained and prominently displayed within the work area.
- h. No smoking signs shall be maintained and prominently displayed within the work place.
- i. At least one fire extinguisher with a minimum rating 2-A:10-B:C shall be required for each work place. In the case of large asbestos projects, at least two such fire extinguishers shall be required.
- j. If the containment area of an asbestos project covers the entire floor of the affected building, or an area greater than 15,000 square feet on any given floor, the installation of a negative air cut off switch or switches shall be required at a single location outside the work place, such as inside a stairwell, or at a secured location in the ground floor lobby when conditions warrant. The required switch or switches shall be installed by a licensed electrician pursuant to a permit issued by the Department of Buildings. If negative pressure ventilation

ASBESTOS ABATEMENT

equipment is used on multiple floors the cutoff switch shall be able to turn off the equipment on all floors.

B. Removal of ACM Utilizing Full Containment Procedures shall be as follows:

1. Preparation Procedures:

- a. Ensure that the Third-Party Air Monitor has performed area monitoring and established a background count prior to the preparatory operations for each removal area, as applicable.
- b. Shut down, isolate, and lock out or tag heating, ventilating, and air conditioning (HVAC) systems which serve or which pass through the Work Area. Vents within the Work Area and seams in HVAC components shall be sealed with tape and two layers of fire retardant polyethylene sheeting. Filters in HVAC systems shall be removed and treated as asbestos-asbestos contaminated waste.
- c. Shut down, disconnect, and lock out or tag all electric power to the Work Area so that there is no possibility of its reactivation until after clearance testing of the Work Area.
- d. Provide and install decontamination enclosure systems in accordance with Sections 3.01 and 3.02 of this Section.
- e. Remove ACM that may be disturbed by the erection of partitions using tent procedures and wet removal methods. Removal shall be limited to a one-foot wide strip running the length/height of the partition.
- f. Pre-clean and remove moveable objects from the Work Area. Pre-cleaning shall be accomplished using HEPA-vacuum and wet-cleaning techniques. Store moveable objects at a location determined by the City.
- g. Protect carpeting that will remain in the Work Area.
 - (1) Pre-clean carpeting utilizing wet-cleaning techniques.
 - (2) Install a minimum of two layers of fire retardant 6-mil reinforced polyethylene sheeting over carpeting.
 - (3) Place a rigid flooring material, minimum thickness of 3/8-inch, over polyethylene sheeting.
- h. Pre-clean all fixed objects to remain within the Work Area using HEPA-vacuum and wet-cleaning techniques.

ASBESTOS ABATEMENT

- i. Seal fixed objects with two individual layers, minimum, of 6-mil fire retardant polyethylene sheeting.
- j. Pre-clean entire Work Area utilizing HEPA-vacuum and wet-cleaning techniques. Methods of cleaning that raise dust; such as dry sweeping or use of vacuum equipment not equipped with HEPA-filters, is prohibited.
- k. Install isolation barriers (i.e., sealing of all openings, including but not limited to windows, corridors, doorways, skylights, ducts, grills, diffusers, and other penetrations within the Work Area) using two layers of 6-mil fire retardant polyethylene sheeting and duct-tape.
- l. Construct rigid framework to support Work Area barriers.
 - (1) Framework shall be constructed using 2-inch by 4-inch wooden or metal studs placed 16 inch on center when existing walls and/or ceiling do not exist for all openings greater than 32 square feet. Framework is not required except where one dimension is one foot or less or the opening will be used as an emergency exit.
 - (2) Apply a solid construction material, minimum thickness of 3/8-inch to the Work Area side of the framing. In secure interior areas, not subject to access from the public or building occupants, an additional layer of 6-mil fire retardant polyethylene sheeting may be substituted for the rigid construction material.
 - (3) Caulk all wall, floor, ceiling, and fixture joints to form a leak tight seal.
- m. Seal floor drains, sumps, shower tubs, and other collection devices with two layers of 6-mil fire retardant plastic and fire rated plywood, as necessary, and provide a system to collect all water used by the asbestos abatement contractor. Collected water shall be passed through a water filtration system prior to being discharged into the sanitary sewer.
- n. Remove ceiling mounted objects not previously sealed that will interfere with removal operations. Mist object and surrounding ACM with amended water prior to removal to minimize fiber dispersal. Clean all moveable objects using HEPA-vacuum and wet-cleaning techniques prior to removal from the Work Area.

ASBESTOS ABATEMENT

- o. Fiberglass insulation with intact coverings shall be protected in place during abatement activities. These materials shall be protected with two layers of 6-mil fire retardant polyethylene sheeting as isolation barriers and two additional layers of 6-mil fire retardant polyethylene sheeting serving as primary and secondary surface barriers.
- p. Install and initiate operation of AFDs to provide a negative pressure and a minimum of four air changes per hour within the Work Area relative to surrounding non-Work Areas. Do not shut down AFDs until the Work Area is released to the City following final clearance procedures. The use of HEPA-filtered vacuum to produce a negative air pressure inside the enclosure is prohibited.
- q. Maintain emergency and fire exits from the Work Areas or establish alternative exits satisfactory to the local fire officials. Emergency exits and routes shall be established and clearly marked with florescent paint or other effective designations to permit easy location from anywhere within the Work Area. Cutting tools (e.g., knife, razor) shall be attached to the work area side of the sheeting for use in the event that the barrier must be cut open to allow egress. Emergency exits shall be secured to prevent access from uncontaminated areas and yet permit emergency exiting. Exits shall be checked daily against exterior blockage or impediments to exiting.
- r. Temporary lighting within the Work Area and decontamination system shall be provided as required to achieve minimum illumination levels.
- s. Hand power tools used to drill, cut into, or otherwise disturb ACM shall be manufacturer-equipped with HEPA filtered local exhaust ventilation.
- t. Prior to being plasticized, the Work Areas shall be cleaned using HEPA vacuum equipment and/or wet cleaning methods as appropriate. Methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters, shall not be used.
- u. Plasticize the area after pre-cleaning, using the following procedures.
 - (1) Cover floors with one layer of 6-mil fire retardant polyethylene sheeting, turning layer a minimum of 6 inches up wall, and seal layer to wall.

ASBESTOS ABATEMENT

- (2) Cover walls with one layer of 6-mil fire retardant polyethylene sheeting, overlapping wall layer a minimum of 6 inches, and seal layer to floor layer.
 - (3) Cover floors with a second layer of 6-mil fire retardant polyethylene sheeting, turning layer a minimum of 12 inches up wall, and seal layer to wall.
 - (4) Cover walls with a second layer of fire retardant 6-mil polyethylene sheeting, overlapping wall layer a minimum of 12 inches, and seal layer to floor layer.
 - (5) In areas where demolition is required to access ACM, a layer of fire retardant 6-mil reinforced polyethylene sheeting shall be placed on the floor of the enclosure.
 - (6) Perform demolition required to access ACM. Debris resulting from demolition activities shall be disposed of as ACM waste as described in this Specification.
 - (7) Repeat preparation of areas accessed by demolition activities as described above.
- v. Suspended ceiling tiles and T-grid components shall remain in place until the preparation of the Work Area below the ceiling tiles are completed and personnel and equipment decontamination enclosures have been constructed.
- w. Scaffolds shall be provided for workers engaged in work that cannot safely be performed from the ground or other solid Work Area surface.
- x. Means of egress shall not be obstructed by hardwall barriers.
- y. Pre-Removal Inspections.
- (1) Prior to removal of any ACM, the asbestos abatement contractor shall notify the Third-Party Air Monitor and request a pre-removal inspection. Posting of warning signs, building of decontamination enclosure systems, and all other preparatory steps have been taken prior to notification of the Third-Party Air Monitor.
 - (2) Asbestos abatement contractor shall correct any deficiencies observed by Third-Party Air Monitor at no additional cost to City.

ASBESTOS ABATEMENT

- (3) Following the Third-Party Air Monitor's approval of the Work Area preparations, removal of ACM may commence.
2. Removal of ACM Within Full Containment:
 - a. Mist material with amended water. Allow sufficient time for the amended water to penetrate the material to be removed.
 - b. Remove the material using hand tools such as scrapers or putty knives. Wire-mesh or wood lathe reinforcing, when present, shall be cut into manageable pieces and disposed of as ACM.
 - c. Remove any residual material from the substrate using wet cleaning methods and nylon-bristled hand brushes.
 - d. Place the removal material immediately into a properly labeled fire retardant 6-mil polyethylene bag. All material shall be properly containerized and decontaminated prior to removal from the Work Area.
 - e. Following the completion of removal of insulation, all visible residue shall be removed from the substrate.
3. Following Removal of ACM utilizing Full Containment Procedures:
 - a. First Cleaning:
 - (1) Remove any visible accumulation of asbestos material and debris. HEPA-vacuuming and wet cleaning shall be performed on all surfaces inside the Work Area. All sealed drums, plastic bags, and equipment used in the Work Area shall be removed from the Work Area.
 - (2) Upon request of the asbestos abatement contractor, the Third-Party Air Monitor will perform a visual inspection. Evidence of asbestos contamination identified during the inspection will necessitate further cleaning as heretofore specified.
 - (3) Remove first layer of plastic sheathing inside the Work Area. The isolation barriers and decontamination facility shall remain in place and be utilized.
 - b. Second Cleaning:
 - (1) After the first cleaning, the Work Area shall be vacated for twelve hours to allow fibers to settle.

ASBESTOS ABATEMENT

- (2) All objects and surfaces in the Work Area shall be HEPA - vacuumed and wet cleaned for a second cleaning.
- (3) A thin coat of lockdown encapsulant shall be applied to all plastic covered surfaces in the Work Area.
- (4) When the encapsulant is dry, second layer of polyethylene sheeting on the walls, ceiling and floors shall be removed. Do not remove seals from doors, windows, Isolation Barriers or disconnect the negative pressure equipment.

c. Third Cleaning:

- (1) A minimum of four hours after the second cleaning, all the surfaces in the Work Area shall be HEPA-vacuumed and wet cleaned for a third cleaning.
- (2) Upon the request of the asbestos abatement contractor, the Third-Party Air Monitor will do final visual inspection for re-occupancy. Evidence of asbestos contamination identified during the inspection will necessitate further cleaning as heretofore specified.
- (3) When the Work Area passes the Third-Party Air Monitor's visual re-occupancy inspection, air sampling shall not begin until at least one hour after the completion of the third cleaning. The Third-Party Air Monitor shall perform air monitoring using aggressive testing techniques. The Third-Party Air Monitor will approve re-occupancy if the specified fiber count in the Work Area is achieved according to the Third-Party Air Monitor.
- (4) When the Work Area passes the re-occupancy test, all controls and seals established shall be removed.
- (5) The cleaned layer of the surface barriers shall be removed from walls and floors.
- (6) The isolation barriers shall remain in place throughout cleanup. Decontamination enclosure systems shall remain in place and be utilized. A thin coat of lockdown encapsulant shall be applied to all surfaces in the work area which were not the subject of removal or abatement, including the cleaned layer of the surface barriers, but excepting sprinklers, standpipes, and other active elements of the fire suppression system.

- d. Final Barrier Removal:
 - (1) Upon receipt of acceptable clearance testing results, polyethylene sheeting and Isolation Barriers shall be removed and disposed accordingly as asbestos-containing material.
 - (2) The area surrounding the abatement work place shall be cleaned of any visible debris utilizing HEPA vacuum and wet methods.
 - e. The Third-Party Air Monitor will conduct a final visual observation. Approval must be granted prior to break down of decontamination facility and asbestos abatement contractor demobilization.
- C. Removal of ACM utilizing NYCDEP Title 15, Chapter 1 §1-106 Tent Containment Procedures and/or Tent and Glove-bag Procedures utilizing NYDEP Title 15, Chapter 1 §1-105 shall be as follows:
- 1. Preparation Procedures:
 - a. Ensure that the Third-Party Air Monitor has performed area monitoring and established a background count prior to the preparatory operations for each removal area, as applicable.
 - b. Shut down, isolate, and lock out or tag heating, ventilating, and air conditioning (HVAC) systems which serve or which pass through the Work Area. Vents within the Work Area and seams in HVAC components shall be sealed with tape and two layers of polyethylene sheeting. Filters in HVAC systems shall be removed and treated as asbestos-asbestos contaminated waste.
 - c. Shut down, disconnect, and lock out or tag all electric power to the Work Area so that there is no possibility of its reactivation until after clearance testing of the Work Area.
 - d. Provide and install decontamination enclosure systems in accordance with PART 3 - EXECUTION, Sections 3.01 and 3.02 of these Specifications. Decontamination facilities may be remote from the Work Areas.
 - e. Construct rigid framework to support Work Area barriers. Framework shall be constructed using 2-inch by 4-inch wooden or metal studs placed 16 inch on center when existing walls and/or ceiling do not exist.

ASBESTOS ABATEMENT

- f. Seal floor drains, sumps, shower tubs, and other collection devices with two layers of fire retardant 6-mil plastic and minimum 3/8" fire rated plywood, as necessary, and provide a system to collect all water used by the asbestos abatement contractor. Collected water shall be passed through a water filtration system prior to being discharged into the sanitary sewer. Any opening greater than 32 square feet shall be framed with 2-inch by 4-inch studding placed 16 inches on center.
- g. Install and initiate operation of AFDs to provide a negative pressure and a minimum of four air changes per hour and negative pressure of -0.02" of water column within the Work Area relative to surrounding non-Work Areas. Do not shut down AFDs until the Work Area is released to the City following final clearance procedures. The use of HEPA-filtered vacuums to produce a negative air pressure inside the enclosure is prohibited.
- h. Maintain emergency and fire exits from the Work Areas or establish alternative exits satisfactory to the local fire officials. Emergency exits and routes shall be established and clearly marked with florescent paint or other effective designations to permit easy location from anywhere within the Work Area. Emergency exits shall be secured to prevent access from uncontaminated areas and yet permit emergency exiting. Exits shall be checked daily against exterior blockage or impediments to exiting.
- i. Temporary lighting within the Work Area and decontamination system shall be provided as required to achieve minimum illumination levels.
- j. Hand power tools used to drill, cut into, or otherwise disturb ACM shall be manufacture equipped with HEPA filtered local exhaust ventilation.
- k. Prior to being plasticized, the Work Areas shall be cleaned using HEPA-vacuum equipment and/or wet cleaning methods as appropriate. Methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters, shall not be used.
- l. There shall be an airlock at the entrance to the tent, unless there is an attached worker or waste decontamination system.
- m. Plasticize the area after pre-cleaning, using the following procedures. Do not apply polyethylene sheeting to the wall and ceiling surfaces that will be demolished to access ACM.
 - (1) Cover floor with one layer of fire retardant 6-mil polyethylene

ASBESTOS ABATEMENT

sheeting, turning layer a minimum of 12 inches up wall, and seal layer to wall.

- (2) Cover walls with one layer of fire retardant 6-mil polyethylene sheeting, overlapping wall layer a minimum of 12 inches, and seal layer to floor layer.
 - (3) Cover ceilings with one layer of fire retardant 6-mil polyethylene sheeting, overlapping wall layer a minimum of 12 inches, and seal layer to wall layer.
 - (4) Repeat procedure for second layer. All joints in polyethylene sheeting shall be glued and taped in such a manner as to prohibit air passage. Joints on plastic layers shall be staggered to reduce the potential for water to penetrate.
 - (5) In areas where demolition is required to access ACM, a layer of fire retardant 6-mil reinforced polyethylene sheeting shall be placed on the floor of the enclosure.
 - (6) Perform demolition required to access ACM. Debris resulting from demolition activities shall be disposed of as ACM as described in this Specification.
 - (7) Repeat preparation of areas accessed by demolition activities as described above.
 - (8) Suspended ceiling tiles and T-grid components shall remain in place until the preparation of the Work Area below the ceiling tiles are completed and personnel and equipment decontamination enclosures have been constructed.
 - (9) Protect non-ACM insulation within the Work Area(s) with two individual layers of fire retardant 6-mil polyethylene sheeting. Sheeting shall remain in-place until satisfactory clearance air monitoring results are achieved.
- n. Installation of glove-bags for removal of thermal system insulation, when required:
- (1) General: Glove-bag operations shall be performed using commercially available glove-bags of at least fire retardant 6-mil, transparent plastic appropriately sized for the diameter of the material to be removed. The use of "moveable" glove-bag techniques is strictly forbidden. At no time, shall the glove-bag be sized to allow for the removal of more than three linear feet of insulation. Glovebag procedures may only be used in

ASBESTOS ABATEMENT

conjunction with full containment of the work area or the tent procedure.

- (2) Place the necessary tools and materials inside of the tool pouch of the glove-bag before the glove-bag procedure begins.
 - (3) Place duct-tape securely around the affected area to form a smooth area to which the glove-bag can be securely fastened.
 - (4) Attach glove-bag to the cable, wire or pipe. Seal top of glove-bag by double folding and stapling. Place duct-tape along the seam to form an airtight seal. Seal sides of glove-bag, where cable, wire or pipe passes through, with duct-tape to form an airtight seal.
 - (5) If the material adjacent to the work section is damaged, terminates, is jointed or contains an irregularity, wrap the section in two layers of 6-mil fire retardant polyethylene sheeting and seal airtight with duct-tape.
 - (6) Smoke test each glove-bag as indicated below. The Third-Party Air Monitor shall be present during all smoke testing.
 - (7) The glovebag shall be placed under negative pressure utilizing a HEPA vacuum, and a smoke tube shall then be aspirated to direct smoke at all seams and seals from outside the glovebag. Any leaks detected by the smoke test shall be duct taped airtight.
 - (8) All necessary tools and materials shall be brought into the work area before the glovebag procedure begins.
 - (9) Glovebag procedures shall be conducted by workers specifically trained in glovebag procedures and equipped with appropriate personal protective equipment.
 - (10) The insulation diameter worked shall not exceed one half the bag working length above the attached gloves.
- o. Glovebag procedures shall be conducted by workers specifically trained in glovebag procedures and equipped with appropriate personal protective equipment.
- p. Pre-Removal Inspections
- (1) Prior to removal of any ACM, the Asbestos abatement contractor shall notify the Third-Party Air Monitor and request

ASBESTOS ABATEMENT

a pre-removal inspection. Posting of warning signs, building of decontamination enclosure systems, and all other preparatory steps have been taken prior to notification of the Third-Party Air Monitor.

- (2) Asbestos abatement contractor shall correct any deficiencies observed by Third-Party Air Monitor at no additional cost to City.
- (3) Following the Third-Party Air Monitor's approval of the Work Area preparations, removal of ACM may commence.

2. Removal of ACM Thermal Insulation Using Glove-Bag Techniques:

- a. Mist material with amended water. Allow sufficient time for the amended water to penetrate the material to be removed.
 - b. Remove the insulation using hand tools such as knives or scissors.
 - c. Exercise caution when removing insulation.
 - d. Remove any residual asbestos-containing insulation from the substrate using wet cleaning methods and nylon-bristled hand brushes.
- (1) Any insulation ends created by this procedure shall be sealed with encapsulant prior to bag removal or thoroughly wetted before bag removal and sealed with wettable cloth end caps and spray glue or any combination of these materials immediately following bag removal.
 - (2) The tool pouch shall be separated from the bag prior to disposal by twisting it and the wall to which it is attached several times, and taping the twist to hold it in place, thus sealing the bag and the pouch which are severed at the midpoint of the twist. Alternatively, the tools can be pulled through with one or both glove inserts, thus turning the gloves inside out. The glove(s) is/are then twist sealed forming a new pouch, taped and several mid-seal forming two separate bags.
 - (3) A HEPA vacuum shall be used for evacuation of the glovebag in preparation for removal of the bag from the surface for clean-up in the event of a spill, and for post project clean-up.
 - (4) With the glovebag collapsed and the ACM in the bottom of the bag, the bag shall be twisted several times and taped to seal that section during bag removal.

ASBESTOS ABATEMENT

- (5) A 6-mil plastic bag shall be slipped around the glovebag while it is still attached to the surface. The bag shall be detached from the surface by removing the tape or cutting the top with blunt scissors.
 - (6) The asbestos-containing waste, the clean-up materials, and protective clothing shall be wetted sufficiently, double-bagged minimizing air content, sealed separately, and disposed of in conformance with applicable regulations.
3. Removal of ACM Utilizing Tent Containment Procedure:
 - a. Tent procedures shall be limited to the removal of less than 260 linear feet and 160 square feet of ACM and shall not result in disturbance of ACM during tent erection.
 - b. Mist material with amended water and/or foam. Allow sufficient time for the amended water to penetrate the material to be removed.
 - c. Cut bands, wire or other items placed over insulation or ACM.
 - d. Remove the ACM using hand tools such as knives or scrapers.
 - e. Exercise caution when removing ACM.
 - f. Remove any residual asbestos-containing material from the substrate using wet cleaning methods.
 - g. Seal exposed ends of remaining insulation or ACM with a "wetable cloth" and/or encapsulant.
 - h. Place the removed material immediately into a properly labeled fire retardant 6-mil polyethylene bag. All material shall be properly containerized and decontaminated prior to removal from the Work Area.
 - i. Following the completion of removal of ACM, all visible residue shall be removed from the substrate.
4. Following Removal of ACM Utilizing Tent Containment or Tent/Glovebag Procedure:
 - a. Clean all visible accumulations of loose ACM. Metal shovels shall not be used within the Work Area.

ASBESTOS ABATEMENT

- b. Accumulations of dust shall be cleaned continuously until completion of clean up.
- c. After removal of all visible accumulations of ACM, the area shall be:
 - (1) Wet cleaned using rags, mops or sponges.
 - (2) Permitted sufficient time to dry, prior to HEPA vacuuming all substrates.
 - (3) Lightly encapsulated to lockdown residual asbestos. A thin coat of an encapsulating agent shall be applied to any surfaces in the Work Area which were not the subject of removal or other remediation activities. In no event shall encapsulant be applied to any surface that was the subject of removal or other remediation activities prior to obtaining satisfactory clearance air monitoring results. Asbestos abatement contractor shall request and pass a visual inspection performed by the consultant before proceeding to the next step. Documentation of passing this inspection shall be recorded in a daily logbook.
 - (4) The Third-Party Air Monitor will conduct a visual observation of the Work Area to verify the absence of asbestos-containing waste materials.
 - (5) If the Work is accepted by the Third-Party Air Monitor based on the inspection, asbestos abatement contractor shall be notified. Conduct the following activities in accordance with the contract and all applicable laws, codes, rules and regulations.
 - (a) All waste shall be removed from the Work Area and holding areas.
 - (b) All tools and equipment are to be removed and decontaminated in the decontamination enclosure system.
 - (6) If the Work is not approved, the Third-Party Air Monitor will inform Asbestos abatement contractor who will then HEPA-vacuum and/or wet-clean the Work Area. The Third-Party Air Monitor will then perform a subsequent visual observation. This process will continue until the Third-Party Air Monitor accepts the Work Area as clean.
 - (7) The Work Area shall be vacated for a minimum of one hour to allow fibers to settle prior to clearance air monitoring, when required.

ASBESTOS ABATEMENT

d. Final Barrier Removal

- (1) Upon receipt of acceptable clearance testing results polyethylene sheeting (inside layers) and Isolation Barriers shall be removed and disposed accordingly as ACM. The tent shall be collapsed inward, enclosing the contaminated clothing. This contaminated material shall be disposed of in another plastic bag. The HEPA vacuum shall be decontaminated and sealed.
- (2) The area surrounding the abatement work place shall be cleaned of any visible debris utilizing HEPA-vacuum and wet methods.

- e. The Third-Party Air Monitor will conduct a final visual inspection. Approval must be granted prior to break down of decontamination facility and asbestos abatement contractor demobilization. Other Information: Extra time required to clean Work Areas in order to achieve clearance criteria shall not be considered grounds for an extension of time for contract completion.

D. Removal of Floor Tile and Mastic utilizing NYCDEP Title 15, Chapter 1 §1-108 Foam/Viscous Liquid Use in Flooring Removal procedures shall be as follows:

1. Preparation of the Work Area:

- a. These procedures only apply to the removal of vinyl asbestos floor tiles (VAT), ACM floor coverings and associated mastics and adhesives, where only the ACM being abated in the work area is flooring material.
- b. Request that the Third-Party Air Monitor perform area monitoring and establish a background count prior to the preparatory operations for each removal area.
- c. Provide and install decontamination enclosure systems in accordance with PART 3 - EXECUTION, Sections 3.01 and 3.02 of these Specifications and NYCDEP Title 15, Chapter 1. Decontamination facilities may be remote from the Work Areas upon approval from NYCDEP.
- d. Shut down, isolate, and lock out or tag heating, ventilating, and air conditioning (HVAC) systems which serve or which pass through the Work Area. Vents within the Work Area and seams in HVAC components shall be sealed with tape and two layers of polyethylene sheeting. Filters in HVAC systems shall be removed and treated as asbestos contaminated waste.

ASBESTOS ABATEMENT

- e. Shut down, disconnect, and lock out or tag all electric power to the Work Area so that there is no possibility of its reactivation until after clearance testing of the Work Area.
- f. Seal floor drains, sumps and other collection devices with two layers of fire retardant 6-mil plastic and fire rated plywood, as necessary, and provide a system to collect all water used by the Asbestos abatement contractor. Collected water shall be passed through a water filtration system prior to being discharged into the sanitary sewer.
- g. Separate by means of airtight barriers (isolation barriers) parts of the building that are not included in the Work Area(s) from parts of the building that will undergo asbestos abatement.
- h. Seal with isolation barriers: open doorways, cased openings, and corridors that will not be used for passage during work.
- i. Isolation barriers shall extend from the floor to the ceiling and form an airtight seal. They shall be built using 2-inch by 4-inch wood or metal framing placed 16 inch on center and shall be braced as necessary. Cover the work sides of the studding with two layers of 6-mil fire retardant, reinforced polyethylene sheeting. Install barriers to form a leaktight seal between the Work Area and adjacent areas. Install isolation barriers in a manner to endure "negative air pressure" within the Work Area.
- j. Completely seal airtight and isolate the Work Area. All openings, including but not limited to doorways, tunnels, ducts, grilles, cracks, diffusers, openings through which pipe conduit passes, and any other penetrations of the Work Area, shall be covered with polyethylene sheeting taped or caulked airtight.
- k. Maintain emergency and fire exits from the Work Areas or establish alternative exits satisfactory to the local fire officials. Emergency exits and routes shall be established and clearly marked with fluorescent paint or other effective designations to permit easy location from anywhere within the Work Area. Emergency exits shall be secured to prevent access from uncontaminated areas and yet permit emergency exiting. Exits shall be checked daily against exterior blockage or impediments to exiting.
- l. Temporary lighting within the Work Area and decontamination system shall be provided as required to achieve minimum illumination levels.

ASBESTOS ABATEMENT

- m. After isolating the area, install and initiate operation of air filtration devices (AFDs) to provide a negative pressure of at least -0.02 inches of water and four air changes per hour within the Work Area relative to surrounding non-Work Areas. In areas where negative air units can not be exhausted to the exterior of the station, units shall be installed in series. When installing units in series, the exhaust from an AFD shall be exhausted into the intake of a second AFD of equal or greater capacity. The exhaust from the second unit shall be directed to the exterior of the Work Area in an area that is not accessible to the public. Both units shall be located inside the Work Area. Exhaust and connect AFD using spiral-reinforced tubing manufactured for this purpose. Do not shut down AFDs until the Work Area is released to the City following final clearance procedures.
- n. Hand power tools used to drill, cut into, or otherwise disturb ACM shall be manufacturer-equipped with HEPA filtered local exhaust ventilation.
- o. Scaffolds shall be provided for workers engaged in work that cannot safely be performed from the ground or other solid Work Area surface.
- p. Work Area Pre-cleaning Procedures: After establishing the decontamination enclosure systems, prepare and pre-clean the Work Area as specified below:
 - (1) Movable and loose items not removed by the City shall be cleaned using HEPA vacuum equipment and/or wet cleaning methods as appropriate and shall be removed from the Work Area and stored at the City's direction.
 - (2) Movable and loose items contaminated with asbestos shall be removed from the Work Areas and properly discarded as asbestos contaminated waste.
 - (3) Fixed objects within the Work Area shall be pre-cleaned using HEPA-vacuum equipment and/or wet cleaning methods as appropriate. Joints of covers or casings shall be sealed with tape and fixed objects enclosed with a minimum of two layers of 6-mil fire retardant polyethylene sheeting sealed airtight with tape. Disassembly of these fixed objects is not required unless otherwise noted. Fixed objects shall include, but not be limited to, light fixtures, junction boxes, hangers and black carrying channels.

ASBESTOS ABATEMENT

- (4) Prior to being plasticized, the Work Areas shall be cleaned using HEPA-vacuum equipment and/or wet cleaning methods as appropriate. Methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA-filters, shall not be used.
 - q. Plasticize the area after pre-cleaning, using the following procedure:
 - (1) Floor surfaces shall be sealed with a minimum of two layers of fire retardant 6-mil plastic sheeting, except where the only ACM being abated in the project is vinyl asbestos floor tile or other flooring material, in which case the floor need not be sealed;
 - (2) Baseboards and wall surfaces shall be sealed with a minimum of two layers of fire retardant 6-mil plastic sheeting up to a minimum height of four feet above the floor. If hand power tools are used during abatement, wall surfaces shall be covered with a layer of fire retardant 6-mil polyethylene sheeting to minimum height of six feet.
 - r. Pre-Removal Inspections
 - (1) Prior to removal of any ACM, the asbestos abatement contractor shall notify the Third-Party Air Monitor and request a pre-removal inspection. Posting of warning signs, building of decontamination enclosure systems, and all other preparatory steps have been taken prior to notification of the Third-Party Air Monitor.
 - (2) Asbestos abatement contractor shall correct any deficiencies observed by Third-Party Air Monitor at no additional cost to City.
 - (3) Following the Third-Party Air Monitor's approval of the Work Area preparations, removal of ACM may commence.
2. Removal of ACM Floor Tile and Mastic:
- a. Prior to actual removal, the floor tiles and associated mastic shall be blanketed and wetted with a minimum 1-inch to 3-inch coating of the acceptable foam or viscous liquid that shall leave an identifiable colored residue when it dissipates and shall be maintained for the duration of the removal until the material is bagged.

ASBESTOS ABATEMENT

- b. The foam or viscous liquid shall be non-toxic, shall not require special respiratory protection from handling, and shall not affect the handling and disposal of the waste.
 - c. The foam or viscous liquid shall coat and wet the ACM. The ACM shall be kept wet through the bagging process.
 - d. Persons entering the work area shall wear correctly-fitting, good-traction rubber boots.
 - e. Remove floor tile and all underlying layers using a flat hoe or scraper. Remove adhesive backing using approved mastic removal solvent. Do not grind or sand floor.
 - f. Completely remove floor tile and adhesive backing using appropriate tools and materials. As material is removed, wrap it in two layers of plastic and place it in labeled containers for transport.
 - g. Completely remove bulk mastic using an approved mastic solvent. Product application shall be in accordance with the manufacturer's instructions and the Material Safety Data Sheet (MSDS) for the product. Do not allow solvent to stand or to be absorbed by sub-floor. Use diatomaceous earth to prevent the flow of solvent under walls or into other areas from which it would be difficult to recover. Absorb spent solvent and associated mastic immediately after use with diatomaceous earth and place in drums dedicated for the disposal of floor tile mastic waste.
 - h. After completion of mastic removal, thoroughly wash the floor with detergent and rinse clean. Use sufficient quantities of diatomaceous earth to soak up water and detergent so that the waste is completely solid. Place waste in sealed drums dedicated for the disposal of floor tile mastic waste. No bulk mastic residue and traces of foam/viscous liquid shall remain on the floor surface following removal and cleaning. It is not necessary to remove stain from pores of concrete.
 - i. Spent mastic removal agents must be properly stored, categorized and disposed. Refer to "ACM Waste Packing and Load Out Procedures".
 - j. On completion of floor mastic removal, the floor shall be smooth, free from ridges and bumps, and suitable to receive replacement flooring.
3. Additional Removal Requirements: The Third-Party Air Monitor shall issue a stop work order if visible emissions are detected outside the Work Areas and/or should the airborne fiber concentrations meet or exceed 0.01 f/cc of air or the background count (use the greater of these two values as the

ASBESTOS ABATEMENT

reference). Work shall not resume until the condition(s) causing the increase are corrected, surfaces are decontaminated using HEPA vacuums or wet cleaning techniques and the Asbestos abatement contractor receives notice from the Third-Party Air Monitor.

4. Following Removal of ACM Floor Tile and Mastic:
 - a. All surfaces shall be wet cleaned.
 - b. HEPA-vacuum all surfaces.
 - c. Conduct the following activities in accordance with the contract and all applicable laws, codes, rules and regulations.
 - (1) All waste shall be removed from the Work Area and holding areas.
 - (2) All tools and equipment are to be removed and decontaminated in the decontamination enclosure system.
 - d. The Third-Party Air Monitor will conduct a visual observation of the Work Area to verify the absence of asbestos-containing waste materials.
 - e. If the Work is not approved, the Third-Party Air Monitor will inform asbestos abatement contractor who will then wet-clean and HEPA-vacuum the Work Area. The Third-Party Air Monitor will then perform a subsequent visual observation. This process will continue until the Third-Party Air Monitor accepts the Work Area as clean.
 - f. Remove polyethylene barriers from the walls of the Work Area. Isolation barriers shall remain in place.
 - g. Perform a thorough HEPA-vacuuming of the Work Area.
 - h. The Third-Party Air Monitor will conduct a visual observation of the Work Area to verify the absence of asbestos-containing waste materials.
 - i. If the Work is not approved, the Third-Party Air Monitor will inform asbestos abatement contractor who will then HEPA-vacuum the Work Area. The Third-Party Air Monitor will then perform a subsequent visual observation. This process will continue until the Third-Party Air Monitor accepts the Work Area as clean.

ASBESTOS ABATEMENT

- j. If results of air sampling performed during abatement activities indicate airborne fiber concentrations of less than 0.01 fibers per cubic centimeter, or the background level, whichever is greater, final clearance air sampling is not required. The abatement action may be considered complete.
 - k. Isolation Barrier Removal
 - (1) Upon receipt of acceptable observation results, polyethylene sheeting and barrier tape shall be removed and disposed accordingly as ACM.
 - (2) The area surrounding the abatement work place shall be cleaned of any visible debris utilizing HEPA vacuum and wet methods.
 - l. The Third-Party Air Monitor will conduct final visual inspection. Approval must be granted prior to break down of decontamination facility and asbestos abatement contractor demobilization. Other Information: Extra time required to clean Work Areas in order to achieve clearance criteria shall not be considered grounds for an extension of time for contract completion.
- E. Removal of ACM Vinyl Asbestos Floor Tiles (VAT) and other Asbestos Containing Materials by Full containment Procedures without Plastic on the Floor utilizing NYC DEP Variance Attachment VA shall be as follows:
- 1. Preparation of the Work Area:
 - a. Request that the Third-Party Air Monitor perform area monitoring and establish a background count prior to the preparatory operations for each removal area.
 - b. Provide and install decontamination enclosure systems in accordance with PART 3 - EXECUTION, Sections 3.01 and 3.02 of these Specifications and the NYCDEP Variance.
 - c. Shut down, isolate, and lock out or tag heating, ventilating, and air conditioning (HVAC) systems which serve or which pass through the Work Area. Vents within the Work Area and seams in HVAC components shall be sealed with tape and two layers of polyethylene sheeting. Filters in HVAC systems shall be removed and treated as asbestos contaminated waste.
 - d. Shut down, disconnect, and lock out or tag all electric power to the Work Area so that there is no possibility of its reactivation until after clearance testing of the Work Area.

ASBESTOS ABATEMENT

- e. Seal floor drains, sumps and other collection devices with two layers of 6-mil fire retardant plastic and fire rated plywood, as necessary, and provide a system to collect all water used by the asbestos abatement contractor. Collected water shall be passed through a water filtration system prior to being discharged into the sanitary sewer.
- f. The foam or viscous liquid shall be non-toxic, shall not require special respiratory protection for handling, and shall not affect the handling and disposal of the waste.
- g. The foam or viscous liquid shall coat and maintain a stable blanket (minimum 1" thickness) for the duration of the removal process and shall leave an identifiable colored residue when it dissipates. The acceptable foam or viscous liquid shall be maintained for the duration of the removal until the material is bagged.
- h. The foam or viscous liquid shall coat and wet the ACM. The ACM shall be kept wet through the bagging process.
- i. Baseboards and wall surfaces up to a minimum height of four feet above the floor shall be covered with a layer of fire retardant 6-mil plastic sheeting. If hand power tools are used during the abatement, wall surfaces shall be covered with a layer of fire retardant 6-mil polyethylene sheeting to a minimum height of six feet.
- j. Negative air pressure ventilation shall be provided to allow make-up air into the work area, and the air outlet from the work area shall be at or near the floor level.
- k. Separate by means of airtight barriers (isolation barriers) parts of the building that are not included in the Work Area(s) from parts of the building that will undergo asbestos abatement.
- l. Seal with isolation barriers: open doorways, cased openings, and corridors that will not be used for passage during work.
- m. Isolation barriers shall extend from the floor to the ceiling and form an airtight seal. They shall be built using 2-inch by 4-inch wood or metal framing placed 16 inch on center and shall be braced as necessary. Cover the work sides of the studding with two layers of 6-mil reinforced, fire retardant polyethylene sheeting. Do not cover wall surfaces or track boxes that will be affected by abatement activities. Install barriers to form a leaktight seal between the Work Area and adjacent areas. Install isolation barriers in a manner to endure "negative air pressure" within the Work Area.

ASBESTOS ABATEMENT

- n. Completely seal airtight and isolate the Work Area. All openings, including but not limited to doorways, tunnels, ducts, grilles, cracks, diffusers, openings through which pipe conduit passes, and any other penetrations of the Work Area, shall be covered with polyethylene sheeting taped or caulked airtight.
- o. Maintain emergency and fire exits from the Work Areas or establish alternative exits satisfactory to the local fire officials. Emergency exits and routes shall be established and clearly marked with fluorescent paint or other effective designations to permit easy location from anywhere within the Work Area. Emergency exits shall be secured to prevent access from uncontaminated areas and yet permit emergency exiting. Exits shall be checked daily against exterior blockage or impediments to exiting.
- p. Temporary lighting within the Work Area and decontamination system shall be provided as required to achieve minimum illumination levels.
- q. After isolating the area install and initiate operation of air filtration devices (AFDs) to provide a negative pressure of at least -0.02 inches of water and six air changes per hour within the Work Area relative to surrounding non-Work Areas. In areas where negative air units cannot be exhausted to the exterior of the station, units shall be installed in series. When installing units in series, the exhaust from an AFD shall be exhausted into the intake of a second AFD of equal or greater capacity. The exhaust from the second unit shall be directed to the exterior of the Work Area in an area that is not accessible to the public. Both units shall be located inside the Work Area. Exhaust and connect AFD using spiral-reinforced tubing manufactured for this purpose. Do not shut down AFDs until the Work Area is released to the City following final clearance procedures.
- r. Hand power tools used to drill, cut into, or otherwise disturb ACM shall be manufacturer-equipped with HEPA filtered local exhaust ventilation.
- s. Scaffolds shall be provided for workers engaged in work that cannot safely be performed from the ground or other solid Work Area surface.
- t. Work Area Pre-cleaning Procedures: After establishing the decontamination enclosure systems, prepare and pre-clean the Work Area as specified below:

ASBESTOS ABATEMENT

- (1) Movable and loose items not removed by the City shall be cleaned using HEPA vacuum equipment and/or wet cleaning methods as appropriate and shall be removed from the Work Area and stored at the City's direction.
 - (2) Movable and loose items contaminated with asbestos shall be removed from the Work Areas and properly discarded as asbestos-asbestos contaminated waste.
 - (3) Fixed objects within the Work Area shall be pre-cleaned using HEPA-vacuum equipment and/or wet cleaning methods as appropriate. Joints of covers or casings shall be sealed with tape and fixed objects enclosed with a minimum of two layers of 6-mil fire retardant polyethylene sheeting sealed airtight with tape. Fixed objects shall include, but not be limited to, light fixtures, junction boxes, hangers and black carrying channels.
 - (4) Prior to being plasticized, the Work Areas shall be cleaned using HEPA-vacuum equipment and/or wet cleaning methods as appropriate. Methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA-filters, shall not be used.
- u. Plasticize the area after pre-cleaning, using the following procedure:
- (1) Cover walls with one layer of 6-mil fire retardant polyethylene sheeting, and seal to floor.
 - (2) Cover walls with a second layer of 6-mil fire retardant polyethylene sheeting, overlapping first wall layer a minimum of 12 inches, and seal to floor.
- v. Pre-Removal Inspections
- (1) Prior to removal of any ACM, the asbestos abatement contractor shall notify the Third-Party Air Monitor and request a pre-removal inspection. Posting of warning signs, building of decontamination enclosure systems, and all other preparatory steps have been taken prior to notification of the Third-Party Air Monitor.
 - (2) Asbestos abatement contractor shall correct any deficiencies observed by Third-Party Air Monitor at no additional cost to City.

ASBESTOS ABATEMENT

- (3) Following the Third-Party Air Monitor's approval of the Work Area preparations, removal of ACM may commence.
2. Removal of ACM Within Full Containment:
 - a. Mist material with amended water. Allow sufficient time for the amended water to penetrate the material to be removed.
 - b. Remove the material using hand tools such as scrapers or putty knives. Wire-mesh or wood lathe reinforcing, when present, shall be cut into manageable pieces and disposed of as ACM.
 - c. Remove any residual material from the substrate using wet cleaning methods and nylon-bristled hand brushes.
 - d. Place the removal material immediately into a properly labeled 6-mil fire retardant polyethylene bag. All material shall be properly containerized and decontaminated prior to removal from the Work Area.
 - e. Following the completion of removal of insulation, all visible residue shall be removed from the substrate
3. Following Removal of ACM utilizing Full Containment Procedures:
 - a. First Cleaning:
 - (1) Clean-up procedures shall involve removal and bagging of the ACM, of visible accumulations of asbestos containing waste, and of all traces of foam or similar viscous liquid. Following the removal of all debris, the work area shall be thoroughly wet cleaned and HEPA vacuumed.
 - (2) Upon request of the asbestos abatement contractor, the Third-Party Air Monitor will perform a visual inspection. Evidence of asbestos contamination identified during the inspection will necessitate further cleaning as heretofore specified.
 - (3) Remove first layer of plastic sheathing inside the Work Area. The isolation barriers and decontamination facility shall remain in place and be utilized.
 - b. Second Cleaning:
 - (1) After the first cleaning, the Work Area shall be vacated for twelve hours to allow fibers to settle.

ASBESTOS ABATEMENT

- (2) All objects and surfaces in the Work Area shall be HEPA - vacuumed and wet cleaned for a second cleaning.
- (3) A thin coat of lockdown encapsulant shall be applied to all plastic covered surfaces in the Work Area.
- (4) When the encapsulant is dry, second layer of polyethylene sheeting on the walls and ceiling shall be removed. Do not remove seals from doors, windows, Isolation Barriers or disconnect the negative pressure equipment.

c. Third Cleaning:

- (1) A minimum of four hours after the second cleaning, all the surfaces in the Work Area shall be HEPA-vacuumed and wet cleaned for a third cleaning.
- (2) Upon the request of the asbestos abatement contractor, the Third-Party Air Monitor for observing whether cleaned areas are free of dust, dirt, and debris will do final visual inspection for re-occupancy. Evidence of asbestos contamination identified during the inspection will necessitate further cleaning as heretofore specified.
- (3) When the Work Area passes the Third-Party Air Monitor 's visual re-occupancy inspection, air sampling shall not begin until at least one hour after the completion of the third cleaning. The Third-Party Air Monitor shall perform air monitoring using aggressive testing techniques. The Third-Party Air Monitor will approve re-occupancy if the specified fiber count in the Work Area is achieved according to the Third-Party Air Monitor.
- (4) When the Work Area passes the re-occupancy test, all controls and seals established shall be removed.

d. Final Barrier Removal:

- (1) The work area shall be allowed to dry completely before the visual inspection is conducted. The project monitor and asbestos handler supervisor shall confirm the absence in the work area of ACM, asbestos-containing waste or debris, and foam or other viscous liquid.

ASBESTOS ABATEMENT

- (2) Upon successful visual inspection and acceptable clearance testing results, plastic sheeting shall be removed from baseboards and wall surfaces. Isolation barriers shall remain in place.
 - (3) The area surrounding the abatement work place shall be cleaned of any visible debris utilizing HEPA vacuum and wet methods.
 - e. The Third-Party Air Monitor will conduct a final visual observation. Approval must be granted prior to break down of decontamination facility and asbestos abatement contractor demobilization.
- F. Removal of ACM from Vertical Exterior Surfaces utilizing NYCDEP Title 15, Chapter 1 §1-109 Abatement from Vertical Exterior Surfaces procedures shall be as follows:

Preparation procedures: This procedure shall apply to the abatement of asbestos-containing materials from vertical exterior surfaces such as, but not limited to caulking or glazing compounds, asphaltic materials or tar, cement siding or shingles (including transite), paints, sealants coping stone caps or clay roof tiles.

- a. The entire surface to be abated and ground-level perimeter shall be considered the work area unless partitions and warning tape are used to define the work area.
- b. A restricted area shall be established using warning tape extending at least 25 feet from the affected areas of the building or to the nearest vertical obstruction or the curb.
- c. The restricted area may be entered only by certified workers or authorized visitors.
- d. Before plasticizing, the restricted area shall be inspected for ACM debris and, if necessary, pre-cleaned using HEPA vacuums and wet methods.
- e. All openings to the building or structure's interior which are within 25 feet of the affected ACM shall be closed and sealed.
- f. Scaffolding erected to access the ACM shall be constructed, maintained, and used in accordance with applicable federal, state, and city laws.
- g. Horizontal surfaces beneath the affected ACM shall be covered with two layers of fire-retardant 6-mil plastic to a width of six feet.

ASBESTOS ABATEMENT

- h. Elevated platforms being used to access the affected ACM shall be plasticized with two layers of fire-retardant 6-mil plastic, which shall extend up from the platform to at least the height of the mid-rail on three sides, and shall be attached directly to the building just below the surfaces under abatement.
- i. The ground-level restricted area shall be cleared of all moveable objects and plasticized with two sheets of fire-retardant 6-mil plastic, which shall be extended one foot up the side of the building. The plasticized area shall be ten feet wide for every floor up to a maximum width of thirty feet, or to the curb. This plastic shall be cleaned, replaced, and disposed of as asbestos waste at the end of each shift.
- j. Sidewalk bridges in the restricted area shall be covered with two layers of fire retardant 6-mil plastic, placed over and secured to the bridge, spread across the full width, draped over the side to ground level, and extended to a width of at least thirty feet.
- k. Establish a remote decontamination unit in accordance with Section 3.01 within the restricted area.
- l. Construct all elevated work platforms a minimum of one foot below the surface to be abated.
- m. Pre-Removal Inspections
 - (1) Prior to removal of any ACM, the asbestos abatement contractor shall notify the Project Monitor and request a pre-removal inspection. Posting of warning signs, building of decontamination enclosure systems, and all other preparatory steps have been taken prior to notification of the Third-Party Air Monitor.
 - (2) Asbestos abatement contractor shall correct any deficiencies observed by Third-Party Air Monitor at no additional cost to City.
 - (3) Following the Project Monitor's approval of the Work Area preparations, removal of ACM may commence.

2. Removal of ACM Materials:

- a. Mist material with amended water. Allow sufficient time for the amended water to penetrate the material to be removed.

ASBESTOS ABATEMENT

- b. Remove the caulk using hand tools such as knives or scrapers.
 - c. Exercise caution when removing caulking material to prevent damage to windows or skylight openings.
 - d. Remove any residual asbestos-containing caulking material from the substrate using wet cleaning methods and nylon-bristled hand brushes. The use of metal bristled brushes is prohibited.
 - e. Place the removed material immediately into a properly labeled 6-mil polyethylene bag. All material shall be properly containerized and decontaminated prior to removal from the Work Area.
 - f. Following the completion of removal of caulking, all visible residues shall be removed from the substrate.
 - g. Air sampling shall be conducted in compliance with NYC DEP Title 15 Chapter 1, §1-41 Air Sampling Schedule. This sampling shall be performed by the Third Party Air Monitoring Firm.
3. Following Removal of ACM :
- a. The stripped substrate shall be HEPA vacuumed and wet-wiped.
 - b. A visual clearance inspection shall be conducted by the asbestos handler supervisor and project monitor after the work area dries, to ensure the absence of ACM residue or debris in the work area.
 - c. After the inspection is completed, the warning tapes and barriers may be removed.
 - d. The clearance inspection shall be documented in the log and the project air sampling log.
 - e. Air monitoring shall be conducted in accordance with relevant provisions.
 - f. Asbestos abatement contractor shall request and pass a visual inspection performed by the consultant before proceeding to the next step. Documentation of passing this inspection shall be recorded in a daily logbook.
 - g. The Third-Party Air Monitor will conduct a visual observation of the Work Area to verify the absence of asbestos-containing waste materials.
 - h. If the Work is accepted by the Third-Party Air Monitor based on the inspection, asbestos abatement contractor shall be notified. Conduct the

ASBESTOS ABATEMENT

following activities in accordance with the contract and all applicable laws, codes, rules and regulations:

- (1) All waste shall be removed from the Work Area and holding areas.
 - (2) All tools and equipment are to be removed and decontaminated in the decontamination enclosure system.
- i. If the Work is not approved, the Third-Party Air Monitor will inform Asbestos abatement contractor who will then HEPA-vacuum and/or wet-clean the Work Area. The Third-Party Air Monitor will then perform a subsequent visual observation. This process will continue until the Third-Party Air Monitor accepts the Work Area as clean.
 - j. Final Barrier Removal
 - (1) Upon receipt of acceptable observation results, polyethylene sheeting and barrier tape shall be removed and disposed accordingly as ACM.
 - (2) The area surrounding the abatement work place shall be cleaned of any visible debris utilizing HEPA vacuum and wet methods.
 - (3) The Third-Party Air Monitor will conduct final visual inspection. Approval must be granted prior to break down of decontamination facility and asbestos abatement contractor demobilization. Other Information: Extra time required to clean Work Areas in order to achieve clearance criteria shall not be considered grounds for an extension of time for contract completion.
- G. Removal of ACM Roofing and Flashing Materials utilizing NYC DEP § 1-107 Foam Procedure for Roof Removal shall be as follows:
1. Preparation procedures:
 - a. These procedures apply only to the removal of asbestos-containing roofing material (ACRM) from exterior roof surfaces. The work area on the roof shall be cordoned off with clearly visible barriers such as caution tape, and only authorized persons shall have access.
 - b. The foam or viscous liquid shall be non-toxic, shall not require special respiratory protection for handling, and shall not affect the handling and disposal of the waste.

ASBESTOS ABATEMENT

- c. The foam or viscous liquid shall coat and maintain a stable blanket (minimum 1" thickness) for the duration of the removal process and shall leave an identifiable colored residue when it dissipates.
- d. The foam or viscous liquid shall wet the ACRM. The ACRM shall be kept wet through the bagging process.
- e. Persons entering the work area shall wear correctly-fitting, good traction rubber boots.
- f. Abatement shall not be carried out during adverse weather conditions (e.g., precipitation, high winds, ambient temperature below 32 degrees Fahrenheit, etc.).
- g. The worker decontamination unit may be attached to each work area at an entry/exit from each work area, or may be remote, in which case it shall be equipped with an airlock at the entrance. In addition to the shower head(s), the shower room shall be equipped with a flexible hose for waste decontamination for removal of less than 1,000 square feet of ACRM. For 1,000 square feet or more of ACRM removal, a separate waste decontamination facility shall be located at an entry/exit from each work area. Remote holding areas for the asbestos containing waste shall comply with Title 16, Chapter 8, Rules of the City of New York (16 RCNY 8 et. seq.).
- h. Movable objects shall be removed from the work area, or kept in place and wrapped in one sheet of fire retardant 6 mil plastic sheeting.
- i. Provisions shall be made to ensure a safe and adequate air supply to affected building(s). All vents, skylights, air intakes, windows and doors opening onto the roof, and all other openings shall be sealed with 2 layers of fire retardant 6 mil plastic or fitting with HEPA filters when appropriate. Temporary extensions may be installed to a height of 10 feet to ensure adequate air exchange instead of sealing vents, air intakes, etc., with 2 layers of plastic or HEPA filters. Drains may be equipped with 5 micron filtering system in lieu of being sealed.
- j. Fixed objects including perimeter walls, bulkheads, cooling towers, ducts and other rooftop appurtenances shall be covered in one sheet of fire retardant 6 mil plastic up to a height of at least six feet.
- k. THE ASBESTOS ABATEMENT CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTION OF THE INTERIOR SPACES BENEATH THE ROOF.

ASBESTOS ABATEMENT

- l. All office equipment and furniture, including but not limited to desks, chairs, computers, printers, cabinets, etc., carpeted and wooden floors shall be covered with one layer of 6- mil plastic sheeting.
- m. THE ASBESTOS ABATEMENT CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE THAT MAY OCCUR IN THE INTERIOR SPACES, INCLUDING BUT NOT LIMITED TO OFFICE EQUIPMENT, FURNITURE, FLOORS, ETC., BENEATH THE ROOF DURING ALL PHASES OF THE ROOF ABATEMENT.
- n. The asbestos abatement contractor shall provide temporary roof protection consisting of 10-mil polyethylene sheeting following abatement over the open roof areas. Strict coordination with the General Asbestos abatement contractor, Construction Project Manager and/or Architect is required and necessary during this phase of abatement.
- o. Preliminary examination shall be conducted and precautions shall be taken to prevent damage to the interior of the building, including but not limited to office equipment, furniture, carpeted and wooden floors, etc., and to ensure no adverse effect on the structural stability of the roof due to the abatement activity.
- p. Abatement activities shall not be carried out during adverse weather conditions (e.g., precipitation, heavy winds, etc.).
- q. The floor area between the remote decontamination facility and the Work Area must be protected with 2 layers of 6-mil. polyethylene sheeting suitably anchored.
- r. Provisions shall be made to ensure a safe and adequate air supply to affected building(s). All vents, skylights, air intakes, windows and doors opening onto the roof, and all other openings are to be sealed with two layers of 6-mil plastic or fitted with HEPA-filters where appropriate. In lieu of sealing vents, air intakes, etc., with two layers of plastic or HEPA-filters, temporary extensions may be installed to a height of 10 feet to ensure adequate air exchange. Drains may be equipped with 5 micron filtering systems in lieu of being sealed.
- s. Pre-Removal Inspections:

ASBESTOS ABATEMENT

- (1) Prior to removal of any ACM, the Asbestos abatement contractor shall notify the Third-Party Air Monitor and request a pre-removal inspection. Posting of warning signs, building of decontamination enclosure systems, and all other preparatory steps have been taken prior to notification of the Third-Party Air Monitor.
- (2) Asbestos abatement contractor shall correct any deficiencies observed by Third-Party Air Monitor at no additional cost to City.
- (3) Following the Third-Party Air Monitor's approval of the Work Area preparations, removal of ACM may commence.

2. Removal of ACM Roofing and Flashing Materials:

- a. The asbestos abatement contractor shall be responsible for the removal of all roofing components, including multiple layers of built-up membrane, tar, vapor barrier and/or flashing down to the substrate/deck.
- b. Prior to actual removal, the built-up roofing shall be blanketed and wetted with a minimum 1" coating of the acceptable foam or viscous liquid which shall be maintained for the duration of the removal until the material is bagged. The foam or viscous liquid shall be confined to the work area.
- c. Hand-held power tools used to drill, cut into, or otherwise disturb the ACRM shall be equipped with the HEPA-filtered local exhaust ventilation and operated to prevent potential fiber release.
- d. Abatement shall not be performed in adverse weather conditions (e.g., precipitation, heavy winds, etc.). Asbestos abatement contractor shall protect all exposed roof during adverse weather conditions.
- e. Portable HEPA-vacuum machines shall be available during abatement.
- f. After the ACM removal and bagging, the bagged waste shall be HEPA-vacuumed, and then wet-cleaned and transferred into the shower room for double bagging. The double-bagged waste shall be transferred outside the clean room for its final transfer for storage in an enclosed waste container.

3. Following Removal of ACM Roofing and/or Flashing:

ASBESTOS ABATEMENT

- a. Upon completion of the abatement in roof work area, clean-up procedures shall involve removal and bagging of:
 - b. The asbestos containing roofing material (ACRM)
 - c. Visible accumulations of asbestos containing waste
 - d. All excess foam or similar viscous liquid
 - e. All debris, and shall be followed by a thorough wet cleaning.
 - f. All tools shall be wet cleaned and HEPA-vacuumed, and then removed from the work area upon completion.
 - g. Following the removal of all debris, the work area shall be thoroughly wet cleaned. The work area shall be allowed to dry completely before the visual inspection is conducted. The inspection shall confirm the absence in the work area of:
 - (1) ACM, debris, bagged ACM waste,
 - (2) Excess foam or other viscous liquid.
 - h. If the work area fails visual inspection, it shall undergo another wet cleaning and/or HEPA vacuuming until it passes the visual inspection.
 - i. When the visual inspection and clearance testing is successful, all plastic may be removed.
 - j. Air monitoring shall be conducted in accordance with the relevant provisions of Air sampling shall be conducted in compliance with NYC DEP Title 15 Chapter 1, §1-41 Air Sampling Schedule.
- H. Removal of ACM Vertical and/or Sloping sections of Roof Flashing or of sloping sections of ACRM in New York City utilizing NYC DEP Variance Attachment FT (Addendum Attachment to FR) shall be as follows:
- 1. Preparation procedures:
 - a. Vertical and/or sloping sections of roof flashing, or any sloping sections of ACRM, shall not be removed using procedures of Attachment FR or of any modification of Attachment FR. The preliminary test set forth in this requirement must meet the air monitoring requirements.

ASBESTOS ABATEMENT

- b. At least TWO MODIFIED TENTS constructed as per the DEP/ACP Attachment TM shall be installed, each enclosing not less than 50 square feet approximately nor more than 160 square feet approximately of vertical and/or sloping sections of the in-place roof flashing or sloping sections of ACRM.
- c. Engineering controls shall NOT be applied to each tent and therefore NO air volume changes shall occur within each tent during the flashing removal or during the ACRM removals as specified in Item 4 below.
- d. Using CONTINUOUS spraying at the point of removal, with foam as specified in Attachment FR's section B) within one tent at a time, the vertical and/or sloping sections of roof flashing or the sloping sections of ACRM shall be removed by manual methods.
- e. Inside each tent in sequence, continuous air sampling shall be performed during the entire removal procedure.
- f. The city shall require the Third-Party Air Monitor to perform the air sampling.
- g. The city shall assess the air sampling analyses from each of the two tents and shall declare the in-tent air monitoring to be acceptable.
- h. Any tent inside which any individual analysis exceeded 0.01 fibers/cc of air shall be subjected to final air clearance procedures before dismantling.
- i. Where the in-tent air monitoring gives acceptable results as, removal of the remaining vertical and/or sloping roof flashing or remaining sloping sections of ACRM may be permitted to occur, using CONTINUOUS spraying of foam at ALL points of removal without tent enclosures and foam blanket.
- j. Abatement activities shall not be carried out during adverse weather conditions (e.g., precipitation, heavy winds, etc.).
- k. The work area on the roof shall be cordoned off, and only authorized persons shall have access to the "designated" work area.
- l. Movable objects shall be removed from the work area, or kept in place and wrapped in one sheet of 6-mil plastic sheeting. Fixed objects including perimeter walls, bulkheads, cooling towers, ducts and other rooftop appurtenances shall be covered in one sheet of plastic (minimum height of 6 feet).

ASBESTOS ABATEMENT

- m. The worker decontamination unit shall be constructed at an entry/exit from each work area with at least a shower room and a clean room. In addition to the shower head(s), the shower room shall be equipped with a flexible hose for waste decontamination for removal of less than 1,000 square feet. For more than 1,000 square feet of removal, a separate waste decontamination facility shall be located at an entry/exit from each work area.
- n. The floor area between the remote decontamination facility and the Work Area must be protected with 2 layers of 6-mil. polyethylene sheeting suitably anchored.
- o. Provisions shall be made to ensure a safe and adequate air supply to affected building(s). All vents, skylights, air intakes, windows and doors opening onto the roof, and all other openings are to be sealed with two layers of 6-mil plastic or fitted with HEPA-filters where appropriate. In lieu of sealing vents, air intakes, etc., with two layers of plastic or HEPA-filters, temporary extensions may be installed to a height of 10 feet to ensure adequate air exchange. Drains may be equipped with 5 micron filtering systems in lieu of being sealed.

2. Pre-Removal Inspections:

- a. Prior to removal of any ACM, the asbestos abatement contractor shall notify the Third-Party Air Monitor and request a pre-removal inspection. Posting of warning signs, building of decontamination enclosure systems, and all other preparatory steps have been taken prior to notification of the Third-Party Air Monitor.
- b. Asbestos abatement contractor shall correct any deficiencies observed by Third-Party Air Monitor at no additional cost to City.
- c. Following the Third-Party Air Monitor's approval of the Work Area preparations, removal of ACM may commence.

3. Removal of ACM Vertical and/or Sloping sections of Roof Flashing or the Sloping sections of ACRM:

- a. The asbestos abatement contractor shall be responsible for the removal of all vertical and/or sloping sections of roof flashing or the sloping sections of ACRM down to the substrate/deck.
- b. Abatement shall not be performed in adverse weather conditions (e.g., precipitation, heavy winds, etc.). Asbestos abatement contractor shall protect all exposed roof during adverse weather conditions.

ASBESTOS ABATEMENT

- c. Prior to actual removal, the material shall be blanketed and wetted with a minimum two-inch thick coating of the acceptable foam or viscous liquid which shall be maintained for the duration of the removal until the material is bagged. The foam or viscous liquid shall be confined to the work area.
 - d. Manual methods of removal are recommended, however, if hand-held power tools are used to drill, cut into, or otherwise disturb the asbestos-containing roofing material, the power tools shall be equipped with HEPA-filtered local exhaust ventilation and operated to prevent potential fiber release.
 - e. Portable HEPA-vacuum machines shall be available during abatement.
 - f. After the ACM removal and bagging, the bagged waste shall be HEPA-vacuumed then wet cleaned and transferred into the shower room for double bagging. The double-bagged waste shall be transferred outside the clean room for its final transfer for storage in an enclosed waste container.
4. Following Removal of ACM Vertical and/or Sloping sections of Roof Flashing or the Sloping sections of ACRM:
- a. Upon completion of the abatement in roof work area, clean-up procedures shall involve removal and bagging of:
 - b. The asbestos containing roofing material (ACRM)
 - c. Visible accumulations of asbestos containing waste
 - d. All excess foam or similar viscous liquid
 - e. All debris, and shall be followed by a thorough wet cleaning.
 - f. All tools shall be wet cleaned and HEPA-vacuumed, and then removed from the work area upon completion.
 - g. The work area shall be allowed to dry completely before the visual inspection is conducted. The inspection shall confirm the absence in the work area of:
 - h. ACM, debris, bagged ACM waste,
 - i. Excess foam or other viscous liquid.

ASBESTOS ABATEMENT

- j. If the work area fails visual inspection, it shall undergo another wet cleaning and/or HEPA vacuuming until it passes the visual inspection.
 - k. When the visual inspection and clearance testing is successful, all plastic may be removed.
- I. Removal of ACM Wall Plaster, or ACM Ceiling Plaster plus ACM Wall Plaster utilizing NYC DEP Variance Attachment WP/WC shall be as follows:
- 1. Preparation Procedures:
 - a. Shut down, isolate, and lock out or tag heating, ventilating, and air conditioning (HVAC) systems which serve or which pass through the Work Area. Vents within the Work Area and seams in HVAC components shall be sealed with tape and two layers of polyethylene sheeting. Filters in HVAC systems shall be removed and treated as asbestos contaminated waste.
 - b. Shut down, disconnect, and lock out or tag all electric power to the Work Area so that there is no possibility of its reactivation until after clearance testing of the Work Area.
 - c. Provide and install decontamination enclosure systems in accordance with Sections 3.01 and 3.02 of this Section.
 - d. Remove ACM that may be disturbed by the erection of partitions using tent procedures and wet removal methods. Removal shall be limited to a one-foot wide strip running the length/height of the partition.
 - e. Pre-clean and remove moveable objects from the Work Area. Pre-cleaning shall be accomplished using HEPA-vacuum and wet-cleaning techniques. Store moveable objects at a location determined by the City.
 - f. Protect carpeting that will remain in the Work Area.
 - (1) Pre-clean carpeting utilizing wet-cleaning techniques.
 - (2) Install a minimum of two layers of 6-mil reinforced polyethylene sheeting over carpeting.
 - (3) Place a rigid flooring material, minimum thickness of 3/8-inch, over polyethylene sheeting.

ASBESTOS ABATEMENT

- g. Pre-clean all fixed objects to remain within the Work Area using HEPA-vacuum and wet-cleaning techniques.
- h. Seal fixed objects with two individual layers, minimum, of 6-mil polyethylene sheeting.
- i. Pre-clean entire Work Area utilizing HEPA-vacuum and wet-cleaning techniques. Methods of cleaning that raise dust, such as dry sweeping or use of vacuum equipment not equipped with HEPA-filters, is prohibited.
- j. Install isolation barriers (i.e., sealing of all openings, including but not limited to windows, corridors, doorways, skylights, ducts, grills, diffusers, and other penetrations within the Work Area) using two layers of 6-mil polyethylene sheeting and duct-tape.
- k. Seal floor drains, sumps, shower tubs, and other collection devices with two layers of 6-mil fire retardant plastic and fire rated plywood, as necessary, and provide a system to collect all water used by the Asbestos abatement contractor. Collected water shall be passed through a water filtration system prior to being discharged into the sanitary sewer.
- l. Remove ceiling mounted objects not previously sealed that will interfere with removal operations. Mist object and surrounding ACM with amended water prior to removal to minimize fiber dispersal.
- m. Fiberglass insulation with intact coverings shall be protected in place during abatement activities. These materials shall be protected with two layers of 6-mil polyethylene sheeting as isolation barriers and two additional layers of 6-mil polyethylene sheeting serving as primary and secondary surface barriers.
- n. Install and initiate operation of AFDs to provide a negative pressure of at least six (6) air changes per hour within the Work Area relative to surrounding non-Work Areas. Do not shut down AFDs until the Work Area is released to the City following final clearance procedures. The use of HEPA-filtered vacuum to produce a negative air pressure inside the enclosure is prohibited.
- o. Temporary lighting within the Work Area and decontamination system shall be provided as required to achieve minimum illumination levels.
- p. Hand power tools used to drill, cut into, or otherwise disturb ACM shall be equipped with HEPA filtered local exhaust ventilation.

ASBESTOS ABATEMENT

- q. Plasticize the area after pre-cleaning, using the following procedures.
 - (1) Cover floors with one layer of 6-mil polyethylene sheeting, turning layer a minimum of 6 inches up wall, and seal layer to wall.
 - (2) Cover walls with one layer of 6-mil polyethylene sheeting, overlapping wall layer a minimum of 6 inches, and seal layer to floor layer. Do not cover wall surfaces that will be affected by abatement activities.
 - (3) Cover floors with a second layer of 6-mil polyethylene sheeting, turning layer a minimum of 12 inches up wall, and seal layer to wall.
 - (4) Cover walls with a second layer of 6-mil polyethylene sheeting, overlapping wall layer a minimum of 12 inches, and seal layer to floor layer.
 - (5) In areas where demolition is required to access ACM, a layer of 6-mil reinforced polyethylene sheeting shall be placed on the floor of the enclosure.
 - (6) Perform demolition required to access ACM. Debris resulting from demolition activities shall be disposed of as ACM as described in this Specification.
 - (7) Repeat preparation of areas accessed by demolition activities as described above.
- r. Suspended ceiling tiles and T-grid components shall remain in place until the preparation of the Work Area below the ceiling tiles are completed and personnel and equipment decontamination enclosures have been constructed.
- s. Scaffolds shall be provided for workers engaged in work that cannot safely be performed from the ground or other solid Work Area surface.
- t. Pre-Removal Inspections
 - (1) Prior to removal of any ACM, the Asbestos abatement contractor shall notify the Third-Party Air Monitor and request a pre-removal inspection. Posting of warning signs, building of decontamination enclosure systems, and all other preparatory steps have been taken prior to notification of the Third-Party Air Monitor.

ASBESTOS ABATEMENT

- (2) Asbestos abatement contractor shall correct any deficiencies observed by Third-Party Air Monitor at no additional cost to City.
 - (3) Following the Third-Party Air Monitor's approval of the Work Area preparations, removal of ACM may commence.
2. Removal of ACM Wall Plaster, or ACM Ceiling Plaster plus ACM Wall Plaster utilizing NYC DEP Variance Attachment WP/WC :
 - a. Prepare the area as described in Subparagraph "Gross Removal Area Preparations" of this Section. Carefully spray asbestos ceiling plaster first and wall plaster last with a fine mist of amended water shall occur two times before any such plaster shall be disturbed. Spray the asbestos material repeatedly during work process to maintain a wet condition and to minimize asbestos fiber dispersion.
 - b. Remove any obstruction on walls or ceiling lights as asbestos-asbestos contaminated waste.
 - c. Ceiling Plaster shall be removed before any wall plaster is disturbed and not more than 160 square feet section of the ceiling plaster shall be removed at any one time and ceiling plaster shall not be permitted to fall and/ or drop more than 10 feet.
 - d. Cut wire lath into manageable sections. Cut hanger wires supporting lath and remove asbestos containing material and ceiling intact without dropping them to the floor. Materials shall not be allowed to dry out. As it is removed, pack the material in sealable plastic bags which shall be placed in labeled drums for transport.
 - e. After removal of lath and asbestos containing material, either remove any overspray on decking and any structures above using a stiff nylon bristled brush or clean by some equivalent method to remove all visible residue.
 - f. After the ACM removal and bagging, the bagged waste shall be HEPA-vacuumed then wet cleaned and transferred into the shower room for double bagging. The goose-neck and double-bagged waste shall be transferred outside the clean room for its final transfer for storage in an enclosed waste container.
 - g. Upon completion of the abatement, the enclosed surfaces shall be wet cleaned by using rags, mops or sponges and be lightly encapsulated with clear encapsulant to lockdown residual asbestos.

ASBESTOS ABATEMENT

3. Following Removal of ACM Wall Plaster, or ACM Ceiling Plaster plus ACM Wall Plaster utilizing NYC DEP Variance Attachment WP/WC Procedures:
 - a. First Cleaning:
 - (1) Remove any visible accumulation of asbestos material and debris. HEPA-vacuuming and wet cleaning shall be performed on all surfaces inside the Work Area. All sealed drums, plastic bags, and equipment used in the Work Area shall be removed from the Work Area.
 - (2) Upon request of the asbestos abatement contractor, the Third-Party Air Monitor will perform a visual inspection. Evidence of asbestos contamination identified during the inspection will necessitate further cleaning as heretofore specified.
 - (3) Remove first layer of plastic sheathing inside the Work Area. The isolation barriers and decontamination facility shall remain in place and be utilized.
 - b. Second Cleaning:
 - (1) After the first cleaning, the Work Area shall be vacated for twelve hours to allow fibers to settle.
 - (2) All objects and surfaces in the Work Area shall be HEPA - vacuumed and wet cleaned for a second cleaning.
 - (3) A thin coat of lockdown encapsulant shall be applied to all plastic covered surfaces in the Work Area.
 - (4) When the encapsulant is dry, second layer of polyethylene sheeting on the walls, ceiling and floors shall be removed. Do not remove seals from doors, windows, Isolation Barriers or disconnect the negative pressure equipment.
 - c. Third Cleaning:
 - (1) A minimum of four hours after the second cleaning, all the surfaces in the Work Area shall be HEPA-vacuumed and wet cleaned for a third cleaning.

ASBESTOS ABATEMENT

- (2) Upon the request of the asbestos abatement contractor, the Third-Party Air Monitor for observing whether cleaned areas are free of dust, dirt, and debris will do final visual inspection for re-occupancy. Evidence of asbestos contamination identified during the inspection will necessitate further cleaning as heretofore specified.
- (3) When the Work Area passes the Third-Party Air Monitor's visual re-occupancy inspection, air sampling shall not begin until at least one hour after the completion of the third cleaning. The Third-Party Air Monitor shall perform air monitoring using aggressive testing techniques. The Third-Party Air Monitor will approve re-occupancy if the specified fiber count in the Work Area is achieved according to the Third-Party Air Monitor.
- (4) When the Work Area passes the re-occupancy test, all controls and seals established shall be removed.

d. Final Barrier Removal

- (1) Upon receipt of acceptable clearance testing results, polyethylene sheeting and Isolation Barriers shall be removed and disposed accordingly as asbestos-containing material.
- (2) The area surrounding the abatement work place shall be cleaned of any visible debris utilizing HEPA vacuum and wet methods.

- e. The Third-Party Air Monitor will conduct a final visual observation. Approval must be granted prior to break down of decontamination facility and asbestos abatement contractor demobilization.

4.02 MAINTENANCE OF CONTAINED WORK AREA AND DECONTAMINATION ENCLOSURE SYSTEMS

- A. Ensure that barriers are installed in a manner appropriate to the expected weather conditions during the project and for its duration. Repair damaged barriers and remedy defects immediately upon their discovery. Visually inspect barriers at the beginning and end of each work period.
- B. Visually inspect non-Work Areas and the decontamination enclosure system for water leakage. Check the floor below, ceiling and walls, and view beneath/or around the decontamination enclosure system, for signs of leakage. Perform the visual inspection a minimum of two times for each 8-hour work shift.

PART 5 – ASBESTOS WASTE MANAGEMENT

5.01 ACM WASTE REQUIREMENTS

- A. The asbestos abatement contractor and all sub-asbestos abatement contractors are specifically alerted to the illegal practice of combining asbestos-containing waste (ACW) from one project with the ACW of other projects without using the services of a permitted waste transfer station as defined by 6 NYCRR Part 360 and 364. As part of the shop drawing submittals, the Asbestos abatement contractor must submit for approval the proposed method of transportation and disposal that will be utilized to manage the ACW of this Contract. If a permitted transfer station is to be used, the cost shall be included in the work.. The asbestos abatement contractor must submit a waste manifest consistent with whatever approved method is utilized as part of the invoicing and payment procedures.
- B. The asbestos abatement contractor shall maintain compliance with the strictest set of regulations of Title 15, Chapter 1 of RCNY, NYC LL 70/85, NYS DOL ICR 56, USEPA, Asbestos Regulation 40 CFR Section 61.152, 29 CFR 1926.1101, 29 CFR 1910.1200 (F) of OSHA's Hazard Communication Standards, and other applicable standards.

NOTE: Any penalties incurred for failure to comply with any of the above regulations will be the sole responsibility for fines imposed due to negligence of the Asbestos abatement contractor.

- C. When presenting ACW for storage at the generation site, the Asbestos abatement contractor shall:
1. Wet down ACW in a manner sufficient to prevent all visible emissions of dust into the air.
 2. Seal material in a leak tight container while wet.
 3. Keep ACW separate from any other waste.
- D. When presenting ACW for storage away from the site of generation, the Asbestos abatement contractor shall:
1. Ensure that ACW has been properly packaged as per requirements above.
 2. Examine the containers of ACW to ensure that there are no breaks in the containers and that no visible dust is being released into the air.

ASBESTOS ABATEMENT

3. If examination reveals damage to a container of ACW the Asbestos abatement contractor or person accepting the waste shall immediately wet down the ACW and repackage it into a clean leak tight container. The subsequent repackaging shall be the financial responsibility of the Asbestos abatement contractor and occur at no extra cost to the City.
 4. Keep ACW separate from any other waste.
- E. When storing ACW – The Asbestos abatement contractor shall:
1. Ensure that the ACW has been sufficiently wetted down in tight containers.
 2. Re-wet and repackage any damaged containers.
 3. Maintain at storage site an adequate supply of spare leak tight containers.
 4. Maintain at storage site an adequate supply of amended water.
 5. Keep ACW separate from any other waste.
 6. Keep ACW in a secured, enclosed, and locked container.
 7. If the Asbestos abatement contractor has intention of sorting a quantity of ACW greater than or equal to 50 cubic yards, the Asbestos abatement contractor shall:
 - a. Submit a written request and receive written approval from the City.
- F. When presenting for transport, the Asbestos abatement contractor shall:
1. Ensure that ACW has been sufficiently wetted down.
 2. Examine the integrity of the container's airtight seal.
 3. Re-wet and repackage any damaged containers.
 4. Keep ACW separate from all other waste.
 5. Ensure that a person transporting asbestos waste holds a valid permit issued pursuant to law.
 6. Frequency of Waste Removal:
 - a. Properly packaged and labeled asbestos waste shall be removed from the site on a daily basis. Under no circumstance shall asbestos waste be stored on site without written approval from the City. The Waste Hauler and landfill shall be as indicated on the notifications to regulatory agencies.

ASBESTOS ABATEMENT

- G. Waste Load-out Through Equipment Decontamination Enclosure (Full Decontamination Facility): Place asbestos waste in disposal bags. Large items not able to fit into disposal bags shall be wrapped in one layer of 6-mil thick polyethylene sheeting. Clean outer covering of asbestos waste package by wet cleaning and/or HEPA-vacuuming in a designated part of the Work Area. Move wrapped asbestos waste to the equipment washroom, wet clean each bag or object and place it inside a second disposal bag, or a second layer of 6-mil polyethylene sheeting, as the item's physical characteristics demand. Air volume shall be minimized, and the bags or sheeting shall be sealed airtight with tape.
1. The clean containerized items shall be moved to the equipment decontamination enclosure holding area pending load-out to storage or disposal facilities.
 2. Workers who have entered the equipment decontamination enclosure system from the uncontaminated non-Work Area shall perform load-out of containers from the decontamination enclosure holding area. Dress workers moving asbestos waste to storage or disposal facilities in clean overalls of a color different than from that of coveralls used in the Work Area. Ensure that workers do not enter from uncontaminated areas into the equipment washroom or the Work Area. Ensure that contaminated workers do not exit the Work Area through the equipment decontamination enclosure system.
 3. Thoroughly clean the equipment decontamination enclosure system immediately upon completion of the waste load-out activities, and at the completion of each work shift.
 4. Labeled ACM waste containers or bags shall not be used for non-ACM debris or trash. Any materials placed in labeled containers or bags, including those turned "inside-out", shall be handled and disposed of as ACM waste.
- H. All asbestos materials, wastes, shower water, polyethylene, disposable equipment and supplies shall be disposed of as asbestos contaminated waste, in accordance with the EPA regulation (40 CFR, Section 61.150) and those requirements of the New York Department of Environmental Conservation and New York City Department of Sanitation.
- I. All asbestos materials shall be prepared for transportation in accordance with this specification and all applicable Federal, State, County and City Regulations. asbestos abatement contractor shall submit the following documentation:
1. Where applicable, an EPA Generator's identification number which has been obtained from the EPA for all asbestos waste generated from the project.
 2. Applicable State Waste Hauler license and registration numbers.

ASBESTOS ABATEMENT

3. Federal Hazardous Materials Waste Hauler number.
4. Designated landfill EPA Permit numbers.
- J. Prior to loading asbestos waste the enclosed cargo areas (dumpster) shall be prepared as follows:
 1. Clean via HEPA-vacuum and wet wipe techniques the enclosed cargo areas of all visible debris prior to preparing with polyethylene.
 2. Line the cargo area with two layers of 6-mil polyethylene sheeting to prevent contamination from damaged or leaking containers. Floor sheeting shall be installed first and extend up the walls a minimum of 24-inches. Wall sheeting shall be overlapped and taped securely into place.
- K. Asbestos-containing waste shall be placed on level surfaces in the cargo area of the dumpster and shall be packed tightly to prevent any shifting or tipping of the waste during transportation.
- L. Asbestos-containing waste shall not be thrown into or dropped from the dumpster. All material shall be handled carefully to prevent rupture of the containers.
- M. All personnel engaged in handling and loading of asbestos contaminated waste outside of the Work Area shall wear protective clothing. The disposable clothing shall include head, body and foot protection and color of clothing shall be different from abatement personnel in the Work Area. Minimum respiratory protection shall be half face, dual cartridge, air purifying respirators with HEPA-filters.
- N. Asbestos abatement contractor shall immediately clean debris or residue observed on containers or surfaces outside of the Work Area. Cleaning shall be via HEPA equipped wet/dry vacuums only.
- O. All asbestos-containing waste shall be transported from the abatement site to the landfill by a registered Waste Hauler. When transporting ACW:
 1. Ensure that the ACW has been sufficiently wetted down in a leak tight container.
 2. Re-wet and repackage any damaged containers.
 3. Maintain at storage site an adequate supply of spare leak tight containers.
 4. Maintain at storage site an adequate supply of amended water.
 5. Keep ACW separate from any other waste.
- P. Keep ACW in a secured, enclosed, and locked container.

ASBESTOS ABATEMENT

- Q. Waste transport documents shall conform to the requirements of the U.S. Department of Transportation, Hazardous Materials Transportation Regulation, 49 CFR Part 173 and EPA 40 CFR 61.150 (d)(1)(2). Shipping documents shall be clearly marked with the required designation "RQ Asbestos". Asbestos abatement contractor shall provide a copy of this document to the City.
- R. A uniform hazardous waste manifest shall be prepared by the asbestos abatement contractor and signed by the asbestos abatement contractor each time the asbestos abatement contractor ships a dumpster load of Asbestos-Containing Waste Material. The uniform hazardous waste manifest shall include the site of waste generation, the names and addresses of the Transporter, the asbestos abatement contractor, and the landfill operator with information on the type and number of asbestos-waste containers, time and date. Asbestos abatement contractor shall provide the Construction Project Manager, Third-Party Air Monitor or authorized designated representative with signed copies of the waste manifest before each departure.
- S. Asbestos abatement contractor or his registered hazardous Waste Hauler shall transport asbestos-containing waste material from the abatement site directly to the specified disposal site. Asbestos abatement contractor or their Waste Hauler shall not accept material from any other site when transporting asbestos-containing waste material from the abatement site. The authorized DDC representative or Construction Project Manager reserves the right to travel with asbestos abatement contractor's Waste Hauler to the waste disposal site. No intermediate storage of waste material (i.e., asbestos abatement contractor's warehouse) shall be permitted.
- T. Final or progress application for payments will not be processed unless all hazardous waste manifests generated to date have been received and reviewed by the Construction Project Manager.
- U. All asbestos materials, wastes, shower water, polyethylene disposable equipment and supplies shall be disposed of as asbestos contaminated waste, in accordance with the EPA regulation (40 CFR, Section 61.150) and those requirements of the New York State Department of Environmental Conservation and the New York Department of Sanitation.
- V. Asbestos abatement contractor shall transport all sealed drums to a landfill disposal site approved by the Department of Environmental Conservation and the EPA. Transportation shall be performed by a New York State registered Waste Hauler, where required. When presenting the ACW for disposal the Asbestos abatement contractor or sub Asbestos abatement contractor shall:
 - 1. Ensure that waste container is properly labeled according to the National Emission Standard for Hazardous Air Pollutants (NESHAP); Asbestos Revision, 40 CFR, Part 61, Subpart M. The labels shall include the name of the waste generator and the location where the waste was generated.

ASBESTOS ABATEMENT

2. Comply with all applicable orders issued pursuant to asbestos disposal.
 3. Ensure that ACW has been sufficiently wetted down.
 4. Re-wet and repackage any damaged containers.
 5. Keep ACW separate from all other wastes.
- W. Asbestos abatement contractor shall notify the waste disposal site, at least 24 hours prior to transportation of asbestos contaminated waste to be delivered. Asbestos abatement contractor shall determine if a larger notification period is required.
- X. At the site asbestos abatement contractors or Waste Hauler trucks shall approach the dump location as close as possible for unloading asbestos waste. Containers shall be carefully placed in the ground. Do not throw containers from truck.
- Y. Asbestos abatement contractor or Waste Hauler shall inspect containers as they are unloaded at the disposal site. Material in damaged containers shall be repacked in empty containers, as necessary.
- Z. Asbestos abatement contractor or Waste Hauler shall not remove asbestos-containing waste Material from drums unless required to do so by the disposal site City. Used drums shall be disposed of as asbestos-asbestos contaminated waste.
- AA. All personnel engaged in unloading of the containers at the waste site shall wear protective clothing. The disposable clothing shall include head, body and foot protection. Minimum respiratory protection shall be half face, dual cartridge, air purifying respirators with HEPA-filters. Workers shall remove their protective clothing at the disposal site, place it in labeled disposal bags and leave them with the deposited waste shipment.
- BB. For the compaction operation, the asbestos abatement contractor shall ensure that disposal sites personnel have been provided with personal protective equipment by the disposal operator. If the disposal site City has not provided this protective equipment, the asbestos abatement contractor shall supply protective clothing and respiratory protection for the duration of this operation (PAPR respirators are mandatory).
- CC. If containers are broken or damaged, the asbestos abatement contractor or Waste Hauler shall, using personnel who are properly trained and wearing proper protective equipment, shall repackage the waste in properly labeled containers. Asbestos abatement contractor shall then clean the entire truck and its contents using HEPA-vacuums and wet cleaning techniques until no visible residue is observed.

ASBESTOS ABATEMENT

- DD. Following the removal of all containerized waste, the asbestos abatement contractor shall decontaminate the truck cargo area using HEPA-vacuums and/or wet cleaning techniques until no residue is observed. All 6-mil polyethylene sheeting shall be removed and discarded as asbestos-containing waste material along with contaminated cleaning material and protective clothing, in containers at the disposal site.
- EE. The transporter(s) of all asbestos waste shall not back-haul any items on his return from landfill/disposal site.
- FF. All asbestos waste shall be disposed of in an approved Asbestos Landfill site only.
1. NO PERSON UNDER ANY CIRCUMSTANCES SHALL ABANDON ACW. The same shall be disposed of only by certified persons in approved landfills.
 2. A manifest form will be signed by the Landfill documenting receipt and acceptance of the asbestos-containing waste. This manifest will be furnished to the City of New York within thirty calendar days from the project completion date.
 3. It is the responsibility of the Asbestos Asbestos abatement contractor to determine current waste handling, transportation and disposal regulations for the work site and for each waste disposal landfill. The Asbestos Asbestos abatement contractor must comply fully with these regulations and all appropriate U.S. Department of Transportation, EPA and other Federal, State and Local entities' regulations and all other current legal requirements.
 4. The asbestos abatement contractor shall obtain an agreement from the transporter (s) that the practice of "Back-Hauling" will not be engaged in, with respect to any and all waste loads taken from this site during the work.
 5. The asbestos abatement contractor will document actual disposal of the waste at the designated landfill by having completed a Disposal Certificate and will provide a copy of the same to the Department of Design and Construction.

PART 6 – ACCEPTANCE

6.01 ACCEPTANCE

Upon satisfactory completion of all decontamination procedures, a certificate will be issued by the Construction Project Manager with copies to all parties.

- A. A letter of Compliance stating that all the work on the project was performed in accordance with the Specifications and all applicable Federal, State and Local regulations.
- B. All warranties as stated in the Specifications.

END OF SECTION 028213

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 033000

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 RELATED SECTIONS

- A. Construction Waste Management and Disposal – Section 017419
- B. Sustainable Design Requirements (LEED Building) – Section 018113
- C. Construction IAQ Requirements – Section 018119
- D. Miscellaneous Metals – Section 055000
- E. Steel Pan Stair – Section 005100
- F. Rough Carpentry – Section 061000
- G. Waterproofing – Section 071900
- H. Dewatering – Section 312319
- I. Earthwork – Section 312000
- J. Concrete Walks and Curbs – Section 321313

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. LEED BUILDING Submittal Requirements:

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications.
2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the LEED Consultant for review.

C. Design Mixtures: For each concrete mixture, signed and sealed by a qualified professional engineer registered in the State of the Project, responsible for their preparation.

D. Steel Reinforcement Shop Drawings.

E. Formwork Shop Drawings: Signed and sealed by a qualified professional engineer registered in the State of the Project, responsible for their preparation.

F. Material certificates.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

- B. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5. Sections 1 through 5 and Section 7, "Lightweight Concrete."
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- C. Preinstallation Conference: Conduct conference at Project site.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.2 STEEL REINFORCEMENT

- A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 60 percent.
- B. Reinforcing Bars: ASTM A 615, Grade 60, deformed.
 - 1. Epoxy-Coated Reinforcing Bars: ASTM A 775, epoxy coated, with less than 2 percent damaged coating in each 12-inch bar length.
- C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.
- D. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.
- E. Galvanized-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from galvanized steel wire into flat sheets.
- F. Epoxy-Coated Welded Wire Reinforcement: ASTM A 884, Class A coated, Type 1, plain or deformed steel.
- G. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice."

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type I. Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class F.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- B. Normal-Weight Aggregates: ASTM C 33, graded, 3/4-inch nominal maximum coarse-aggregate size.
 - 1. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Lightweight Aggregate: ASTM C 330, 3/4-inch nominal maximum aggregate size.
- D. Water: ASTM C 94 and potable.
- E. Air-Entraining Admixture: ASTM C 260.
- F. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will 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 C 494, Type A.
 - 2. Retarding Admixture: ASTM C 494, Type B.
 - 3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
 - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
 - 6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.
- G. Macro Synthetic Fiber: Complying with ASTM C 1399 & ASTM C 1609, GRACE STRUX 90/40 or approved equal.

2.4 VAPOR RETARDERS

- A. Plastic Vapor Retarder: ASTM E 1745, Class B. Include manufacturer's recommended adhesive or pressure-sensitive tape.

2.5 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
- F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.
- G. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
- H. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.6 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

2.7 CONCRETE MIXTURES

- 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, according to ACI 301.
- B. Cementitious Materials: 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.
- C. Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength: 4000 psi at 28 days.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
 - 3. Slump Limit: 4 inches, plus or minus 1 inch.
 - 4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size.
 - 5. Synthetic Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 4 lb/cu. yd.
- D. Proportion structural lightweight concrete mixture as follows:

1. Minimum Compressive Strength: 4,000 psi at 28 days.
2. Calculated Equilibrium Unit Weight: 115 lb/cu. ft., plus or minus 3 lb/cu. ft. as determined by ASTM C 567.
3. Slump Limit: 4 inches, plus or minus 1 inch.
4. Air Content: 6 percent, plus or minus 2 percent at point of delivery for nominal maximum aggregate size greater than 3/8 inch.
5. Synthetic Macro Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 4 lb/cu. yd.

2.8 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.9 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information.
 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.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork according to ACI 301 to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Chamfer exterior corners and edges of permanently exposed concrete.

3.2 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. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 VAPOR RETARDERS

- A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Commissioner.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth or 1 inch maximum of concrete thickness as follows:
 - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 - 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 concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: 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.

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of

weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
- C. Cold-Weather Placement: Comply with ACI 306.1.
- D. Hot-Weather Placement: Comply with ACI 301.

3.7 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish,.
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
 3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in 1 direction.
 - 1. Apply scratch finish to surfaces to receive concrete floor toppings to receive mortar setting beds for bonded cementitious floor finishes.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
 - 1. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 - 1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 - 2. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-foot-long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 3/16 inch.
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
 - 1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

3.9 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

- B. Evaporation Retarder: Apply evaporation retarder to unformed 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.
- C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for 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. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - 3. Curing 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. Maintain continuity of coating and repair damage during curing period.
 - a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
 - 4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a 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 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Commissioner. Remove and replace concrete that cannot be repaired and patched to Commissioner's approval.

3.11 FIELD QUALITY CONTROL

- A. Testing and Inspecting: City of New York will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
 - 1. Testing Services: Tests shall be performed according to ACI 301.

B. Special Inspections (Controlled 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 New York City Construction Codes, shall 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 shall be an entity compliant with the requirements of the New York City Construction Codes.
2. Form TR3: Technical Report Concrete Design Mix: The contractor shall 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 shall notify the relevant Special Inspector in writing at least 72 hours before the commencement of any work requiring Special Inspection. The contractor shall be responsible for, and bear related costs to assure that all construction or work shall remain accessible and exposed for inspection purposes until the required inspection is completed.
4. Inspections and tests performed under "Special Inspection" shall 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".

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

GEOFILL LOW DENSITY CELLULAR CONCRETE
SECTION 03 52 16

PART 1 – GENERAL

- A. The general provisions and special provisions of these specifications are hereby made a part of this section and will be read by each subcontractor
- B. Cooperate and coordinate all other trades in executing the work described in this section.
- C. Related Sections:
 - a. Construction Waste Management and Disposal - Section 017419
 - b. Sustainable Design Requirements (LEED Building) - Section 018113
 - c. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3
 - d. Construction IAQ Requirements - Section 018119
- D. Related Documents
 - a. Appendices: BRAC Cellular Abandonment Memo, Langan Engineering, 2010

1.01 SCOPE OF WORK

- A. This work consists of providing Geofill LD, a non-pervious, Low Density Cellular Concrete (LDCC) to fill abandoned cellar space at the location shown in the plans in accordance with the details in the plans and these specifications.

1.02 SITE CONDITIONS

- A. The site is the Bronx River Arts Center (BRAC) at the south end of Bronx River Park. The site is along the north bank of the East Tremont Bridge (Bridge) between Bronx Street to the west and the Bronx River to the west. A bulkhead constructed of tires is along the the Bronx River bank, about 10 to 14 ft east of the building. The east portion of the East Tremont Avenue sidewalk is integrated with the Bridge.
- B. The general topography of the site ranges from about el 15 BPBD along Bronx Street and East Tremont Avenue Bridge to about el 8 BPBD along the east and south edge of the building. East of the building, grades continue to slope down to about el 6 BPBD along the Bronx River Bank. The wing wall for the Bridge is supporting the about 9-ft grade change between Bronx Street and areas south of the BRAC Building.
- C. The BRAC Building is a 4-story brick building with a single cellar level. The cellar of the BRAC Building, with top of slab at about el 6 Borough President of Bronx Datum

(BPBD) is prone for flooding from the Bronx River. According to FEMA Base Flood Plain for the site area, the flood plain levels are about el 11.5 BPBD for the 100-year-flood, about el 10 for the 50-year-flood, and about el 7 for the 10-year-flood.

- D. Soils consist generally of about 6 to 14 ft of fill extending to about el 1 BPBD over organic silty clay to an unknown depth.

1.03 SUBMITTALS

- A. Mix design for Geofill LD, including materials to be used and their sources.
 - B. Resume of contractor showing experience as specified below, including qualifications of contractor's superintendent and/or foreman.
 - C. Description of equipment and placement methods to verify compliance with specifications.
 - D. LEED BUILDING Submittal Requirements: The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 - a. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Sustainable Design Requirements (LEED Building) - Section 018113 of these specifications.
2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the LEED Consultant for review.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Portland cement shall comply with ASTM C150 (Type I, II or III).
- B. Fly ash shall be Class C or Class F and compatible with foaming agent.
- C. Water shall be free from deleterious substances.
- D. Foaming agent shall be Geofill Concentrate (Phone #888-820-3455) conforming to ASTM C796.
- E. Admixtures for water reducing, retarding, accelerating, and other specific properties may be used when recommended by the manufacturer of the foaming agent.
- F. Geofill LD shall have the following properties:
 - 1. Range of Cast Density, PCF 70-75
 - 2. Minimum Compressive Strength (28 Days) PSI 40
 - 3. Flow Consistency per ASTM D6107 Greater than 6"

PART 3 – EXECUTION

3.01 PRODUCTION

- A. Foam generating equipment shall be used to produce a predetermined quantity of pre-formed foam which shall be mixed and blended with cementitious slurry. Equipment shall be calibrated to produce consistent foam with stable, uniform cellular structure.
- B. Geofill LD shall be produced utilizing specialized automated proportioning, mixing, and foam producing equipment, which is capable of meeting the specified properties.
- C. Avoid excessive handling of the material. After sufficient mixing of the foam with slurry, the material shall be conveyed promptly in its final location.
- D. All equipment used must be approved by the foam manufacturer.

3.02 INSTALLATION

- A. All bulkheads and injection points installed shall be capable of withstanding a minimum of 30 PSI or the allowable maximum pressure, whichever is greater and shall be water tight.

- B. Injection ports and pipes must be securely installed and be able to receive a minimum 2" male threaded NPT.
- C. Space injection points at intervals to allow adequate inspection ports so material may be forced from one injection point to the next at pressures below maximum allowable pressure.
- D. All water and other residual materials must be removed from cellar interior prior to initiating filling procedure. If required, dewatering shall be continuous during installation.

3.03 QUALITY CONTROL AND QUALITY ASSURANCE

- A. **LEED BUILDING - GENERAL REQUIREMENTS:**
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.
- B. Contractor shall have a record of experience and quality of work placing foam concrete that is satisfactory to the Engineer. Including the following:
 - 1. Shall be capable of developing a mix design, batching, mixing, handling, and placing LDCC.
 - 2. Shall be regularly engaged in the production and pumping of LDCC for filling abandoned pipes, cellars or other structures.
 - 3. Shall have satisfactory completed at least three (3) similar LDCC projects during the last three (3) years.
 - 4. Workers included the contractor's superintendent and /or foreman, shall be fully qualified to perform the work and have had previous experience in production and pumping of LDCC under similar conditions.

C. TESTING

- 1. A minimum of four (4) 3"x 6" cylinders shall be molded for each shift of operation.
- 2. Geofill LD to be tested at any age after three (3) days for compressive strength. At least two (2) specimens from each set should be tested at 28 days in accordance with ASTM C-495.

3. Contractor shall record and measure wet cast densities at the point of placement regularly. Mix shall be adjusted as required to obtain the specified cast density at the point of placement.
4. Contractor shall record and measure flow consistency regularly in accordance with ASTM D6107

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 042000

UNIT MASONRY

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SECTION INCLUDES

- A. The Work of this Section includes all labor, materials, equipment and services necessary to complete the unit masonry work as shown on the drawings and/or specified herein, including but not necessarily limited to the following:
 - 1. Face brick and back-up brick.
 - 2. Replacement brick to match existing.
 - 3. Metal joint reinforcing, anchors, and related accessories for masonry.
 - 4. Control and expansion joints in masonry, filled with joint fillers.
 - 5. Chases, recesses, pockets and openings in masonry as required for installation of work by others.
 - 6. Building in of items furnished by others into masonry, including access doors, door frames, anchors, sleeves and inserts, and other similar items to be embedded in masonry.
 - 7. Grouting in of metal items built into masonry work.
 - 8. Protection, pointing and cleaning of masonry.

1.3 RELATED SECTIONS

- A. Construction Waste Management and Disposal - Section 017419

- B. Sustainable Design Requirements (LEED Building) - Section 018113
- C. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3
- D. Construction IAQ Requirements - Section 018119
- E. Concrete - Section 033000.
- F. Masonry Restoration and Cleaning – Section 049000
- G. Structural Steel – Section 051200
- H. Miscellaneous Metals - Section 055000.
- I. Building Insulation - Section 072100.
- J. Firestops and smoke seals - Section 078400.
- K. Joint Sealers - Section 079200.
- L. Aluminum Framed Entrances and Storefront - Section 084113
- M. Aluminum Windows and Doors – Section 085113
- N. Breathable Masonry Coating – Section 099200
- O. Coordination with Divisions 21-23 and 26-28.

1.4 SUBMITTALS

- A. Shop Drawings: Submit for:
 - 1. Anchoring details.
 - 2. Control and expansion joint locations and details.
 - 3. Special brick shapes.
- B. Samples (Submit the following):
 - 1. Each type of face brick in sufficient number and color to show full range of color and shade. Submit certification that brick meets ASTM standards specified herein.
 - a. Submit samples of all special shapes required showing color range and sizes.
 - 2. Joint reinforcing, each type, width and proposed location (labeled).
 - 3. Anchors, wedges and ties, each type, width and proposed location (labeled).
 - 4. Joint filler, each type.

C. Mock-ups

1. At a location at the Project site to be designated by the Commissioner and/or City of New York, construct a 48" (minimum) square panel of finished veneer masonry, including the full range of brick and bluestone units and using coursing and jointing patterns anticipated for Project inclusion.
2. Rake out bedding and head joints to a depth of ½" and prepare a series of pointing mortar samples from mortars selected by the Commissioner from among a full range of mortar samples previously submitted. Remove and repoint as many times as necessary to achieve an acceptable finished result.
3. Maintain the approved panel in a protected location throughout the course of the work, where it shall serve as a standard of aesthetic and materials quality against which typical masonry construction shall be judged. At the conclusion of the project remove it from the site.

D. Manufacturer's Literature: Submit technical and installation information for:

1. Mortar materials, each material and mortar type.
2. Certification of mortar mix.
3. Flashing material, descriptive literature.

E. Construction Procedures (Submit the following)

1. Procedures and materials for cleaning masonry work; including certification that cleaner will not adversely affect stone, gaskets, sealants, etc.

E.. LEED BUILDING Submittal Requirements:

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s) and the location (source) of the raw materials used to manufacture the product(s).
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
2. Letters of Certification, provided from the product manufacturer on the manufacturer's

letterhead, to verify the product information supplied for the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM. Mortar mix designs shall be included to verify the amount of recycled material included, by weight.

3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as stated below. Cut sheets shall be submitted with the Construction Manager or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

1.5 QUALITY ASSURANCE

- A. Conform to the following non-cumulative tolerances (any masonry work not meeting these standards shall be re-built as directed by the Commissioner).

1. Variation from the plumb:

- a. In lines and surfaces of columns, walls and arises:
 - 1). In 10 feet 1/8"
 - 2). In any story of 25 feet maximum 1/4"
- b. For external corners, expansion joints and other conspicuous lines:
 - 1). In any story of 25 feet maximum 1/4"

2. Variation from the level or the grades indicated on the drawings; for exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines:

- a. In any bay or 20 feet maximum 1/4"

3. Variation of the linear building lines from established position in plan related portion of columns and partitions:

- a. In any bay or 20 feet maximum 1/4"

4. Variation in cross-sectional dimensions of columns and in thickness of walls:

- a. Minus 1/8"
- b. Plus 1/8"

5. Variation in dimensions of masonry openings:

- a. Horizontal dimension -0" + 1/16"
- b. Vertical dimension +0" - 1/16"

- B. Work of this Section shall conform to the requirements of the following:

1. 1999 ACI 530/ASCE 5/TMS 402 Building Code Requirements for Masonry Structures.
2. 1999 ACI 530-1/ASCE 6/TMS 602 Specifications for Masonry Structures.
3. New York City Building Code, including Local Law 17-95 for Seismic Requirements.

C. LEED BUILDING Performance Criteria:

The following criteria are REQUIRED for the products included in this section:

1. Recycled Steel: Reinforcing bar, rods, steel wire, welded wire fabric, anchors and ties, and miscellaneous steel accessories shall contain a minimum of 75% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials).
3. Adhesives or sealants used for interior work in this section shall meet the requirements of Section 018113.3 : Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
 - a. Certification of recycled content shall be in accordance with the Submittal Requirements of This section.

1.6 PRODUCT HANDLING

- A. General: Deliver, store, handle and protect all materials from damage, moisture, dirt and intrusion of foreign matter. Store all masonry units and mortar materials on raised platforms and under ventilated and waterproof cover. Store packaged materials in manufacturer's unopened containers, marked with manufacturer's name and product brand name. Immediately reseal containers after partial use. Remove and replace damaged materials.
- B. Masonry Units: Pack, deliver and store to prevent breakage, cracking, chipping, spalling or other damage. Store, protect and ventilate units at project site.
- C. Aggregate: Store with provisions for good drainage.
- D. Reinforcement and Anchors: Store and protect so that when placed, joint reinforcement and anchors will be free of soil, dirt, ice, loose rust, scale, or other coatings which would destroy or reduce bond with mortar, and will not be disfigured or bent out of shape.

1.7 CODE REQUIREMENTS

- A. Work of this Section shall conform to all applicable requirements of the New York City Building Code.
 1. For controlled inspection of masonry construction refer to General Conditions.
- B. Conform to New York City Local Law 17-95 for Seismic Requirements.

1.8 TESTING FOR EFFLORESCENCE

- A. Test selected face brick for efflorescence in accordance with ASTM C 67.
- B. If, at the end of the test period, the samples of brick or mortar show efflorescence, the materials represented shall be rejected and new materials shall be re-tested. This process shall be repeated until no efflorescence appears. Testing shall be done by an independent testing laboratory at the expense of the Contractor; submit test results in writing to the Commissioner.

1.9 JOB CONDITIONS

- A. In cold weather, when the outside temperature is below forty (40) degrees F., conform to the requirements of "Cold Weather Masonry Construction and Protection Recommendations" publication by Brick Institute of America (BIA). No anti-freeze admixtures are permitted.
- B. Hot-Weather Requirements: Protect unit masonry work when temperature and humidity conditions produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg. F. and above.

PART 2 PRODUCTS

2.1 MATERIALS

A. Brick

- 1. Size: Unless otherwise indicated, provide brick to match existing in size and texture.
- 2. Facing Brick: ASTM C 216, Grade SW to match existing
 - a. To match existing from Belden Brick Company, Taylor Clay Products, Watertown Brick, or approved equal.
- 3. Where brick is fully concealed provide common brick conforming to ASTM C 62, Grade SW.
- 4. Provide all special molded shapes as indicated on the drawings.
- 5. For sills, caps and similar applications resulting in exposure of brick surfaces which otherwise would be concealed from view, provide uncured units with all exposed surfaces finished.

B. Joint Reinforcing for Masonry Walls

- 1. Seismic Construction: For anchoring face brick to back-up provide No. 280 "S.I.S. Dub'l Loop-Lock Ladder Seismiclip Interlock System" made by Hohmann

& Barnard or equal by manufacturer noted below. All wire used in assembly shall be 3/16" dia. Assembly shall contain ladder reinforcing, welded loops, box tie, seismicclip and continuous wire in face brick mortar joint. Provide special formed prefabricated pieces at corners and intersections of walls or partitions. Reinforcing wire in face brick mortar joint to extend at least 2" into face of brick. Show anchor locations on approved shop drawings.

- a. Reinforcing assembly shall be hot dip galvanized steel finish conforming to ASTM A 153 with zinc coating of 1.5 oz. of zinc per sq. ft, after fabrication.
2. Wire used in assemblies noted above shall be cold drawn steel wire conforming to ASTM A 82.
3. Approved Joint Reinforcing Manufacturers
 - a. Hohmann & Barnard
 - b. Dur-O-Wal
 - c. Heckmann Building Products
 - d. National Wire Products Industries, Inc.
 - e. Or approved equal.

C. Anchors and Ties

1. Dovetail Anchor Slots: Galvanized steel equal to No. 305 anchor slot made by Hohmann & Barnard or approved equal by manufacturer noted above.
2. Wire Mesh: Galvanized sixteen (16) gauge steel wire, 1/4" square mesh, width 1/2" less than wall thickness, by length to suit condition.
3. For anchoring masonry to structural steel, provide hot-dip galvanized steel anchors as listed made by Hohmann & Barnard or approved equal manufacturer noted above. Galvanizing shall conform to ASTM A 153, with zinc coating of 1.5 oz. of zinc per sq. ft.
 - a. No. 355 column anchors.
 - b. No. 356 column anchors.
 - c. No. 357 beam anchors.
 - d. No. 359 F anchor straps with VWT tie.

D. Reinforcing Bars and Rods: ASTM A 615, Grade 60. See Drawings for size.

E. Control and Expansion Joint Fillers

1. Isolation Joint Filler at Abutting Construction and at Intersecting CMU Walls: Compressible and resilient closed cell neoprene gasket with pressure sensitive adhesive backing, thickness 30% greater than thickness of joint. Acceptable joint filler shall be "Everlastic, Type NN-1" by Williams Products, Inc., Hohman and Barnard, Aero Rubber or approved equal. Recess joint filler and install backer rod and sealant as per drawings and Section 07900 of these specifications.

2. Within Face Brick: Provide "Emseal" installed to twenty-five (25) percent compression, as manufactured by Emseal, Wilseal, Balco or approved equal, behind filler rod and sealant installed by Section 07900. Filler depth shall be 2 x joint width.
 - a. Compressible filler between top of brick and bottom of shelf angle shall be "Soft Joint Sealant" made by Polytite, Dayton Superior, W.R. Meadows or approved equal.

2.2 MORTAR MATERIALS

- A. Portland Cement: ASTM C 150, Type 1, standard color, one source.
- B. Hydrated Lime: ASTM C 207, Type S, as manufactured by Corsons, Peters Chemical Co, Chemical Distributors Inc or approved equal.
- C. Sand: Clean, washed, buff colored sand, graded per ASTM C 144.
- D. Water: Clean, fresh and suitable for drinking.

2.3 MORTAR MIX

- A. Exterior Face Brick Construction: Mortar mixes shall meet ASTM C 270, Type N, cement/lime mortar. Colors of mortars shall use coloring agent made by Davis Colors, Lehigh Cement, LM Scofield or approved equal. Color of mortar to meet with Commissioner's approval. The Contractor may use pre-packaged colored mortar equal to "Color Mortar Blend" made by Glen-Gery, Spec Mix, Lehigh Cements or approved equal.
 1. Color of mortar must match existing and meet with Commissioner's approved sample and mock-up panel.
- B. Grout for Unit Masonry: Comply with ASTM C 476 for grout for use in construction of unit masonry. Use grout of consistency (fine or coarse) at time of placement which will completely fill all spaces intended to receive grout.
- C. Mixing
 1. General: Add cement just before mixing and mix dry. Use sufficient amount of water as necessary to produce workable mix. Mix in small batches to make plastic mass.
 2. Mixing: Machine mix all mortars in approved type mixer with device to accurately and uniformly control water. Add hydrated lime dry. Mix dry materials not less than two (2) minutes. Add water, then mix not less than three (3) minutes. Mix only amount of mortar that can be used before initial set. Do not use mortar which has reached its initial set or two (2) hours after initial mixing, whichever comes earlier. Mortar may not be re-tempered. Clean mixer for each batch, whenever mortar type is changed, and at end of each day's work.
 3. Acceleration or other admixtures not permitted.

4. Mortar shall have a flow after suction of not less than seventy-five (75) percent of that immediately after mixing as determined by ASTM C 91.

D. Admixtures

1. No air-entraining admixtures or cementitious materials containing air-entraining admixtures shall be used in the mortar.
2. No antifreeze compounds or other substances shall be used in the mortar to lower the freezing point.
3. Calcium chloride or admixtures containing calcium chloride shall not be used in mortar.

2.4 MISCELLANEOUS MASONRY ACCESSORIES

A. Weep/Vent Products: Use one of the following unless otherwise indicated:

1. Wicking Material: Absorbent rope, made from UV-resistant synthetic fiber, 1/4 to 3/8 inch in diameter, in length required to produce 2-inch (exposure on exterior and 18 inches in cavity. Use only for weeps.
2. Round Plastic Weep/Vent Tubing: Medium-density polyethylene, 3/8-inch OD by 4 inches long.
3. Rectangular Plastic Weep/Vent Tubing: Clear butyrate, 3/8 by 1-1/2 by 3-1/2 inches long.
4. 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. Products: Subject to compliance with requirements, provide one of the following:
 - 1). Advanced Building Products Inc.; Mortar Maze weep vent.
 - 2). Blok-Lok Limited; Cell-Vent.
 - 3). Dayton Superior Corporation, Dur-O-Wal Division; Cell Vents.
 - 4). Heckmann Building Products Inc.; No. 85 Cell Vent.
 - 5). Hohmann & Barnard, Inc.; Quadro-Vent.
 - 6). Wire-Bond; Cell Vent.
 - 7). Or approved equal
5. Vinyl Weep Hole/Vent: One-piece, offset, T-shaped units made from flexible PVC, designed to fit into a head joint and consisting of a louvered vertical leg, flexible wings to seal against ends of masonry units, and a top flap to keep mortar out of the head joint; in color selected by Commissioner.
 - a. Products: Subject to compliance with requirements, provide one of the following:

- 1). Hohmann & Barnard, Inc.; #343 Louvered Weep Hole.
 - 2). Williams Products, Inc.; Williams-Goodco Brick Vent.
 - 3). Wire-Bond; Louvered Weepholes.
 - 4). Or approved equal
- B. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Advanced Building Products Inc.; Mortar Break.
 - b. Archovations, Inc.; CavClear Masonry Mat.
 - c. Dayton Superior Corporation, Dur-O-Wal Division; Polytite MortarStop.
 - d. Mortar Net USA, Ltd.; Mortar Net.
 - e. Or approved equal.
 2. Provide one of the following configurations:
 - a. Sheets or strips full depth of cavity and installed to full height of cavity.

2.5 THRU-WALL FLASHING

- A. Provide 40 mil EPDM sheet membrane flashing shall be "Pre-Kleened EPDM Thru-Wall Flashing" as manufactured by Carlisle Corp, manufacturers listed below or approved equal. Provide sealants and tapes as recommended by the manufacturer. Provide preformed corner sections "end dams" with system.
3. Provide flashing for surface adhered applications at sheathed areas with stainless steel termination bar.
- B. Acceptable Alternate Flashing: 60 mil uncured neoprene made by Emseal Corp. or American Hydro-Tech or 40 mil Hyload Flashing Membrane made by Hyload Inc. or approved equal.
- C. Aluminum Flashing: as identified in Section 076200, Sheet Metal Flashing.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

- A. Inspection
1. Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence.
 2. Verify that masonry may be completed in accordance with all pertinent codes and regulations, the referenced standards, and the original design.
 3. Do not start any work until mock-ups are approved by the Commissioner.

B. Discrepancies

1. In the event of discrepancy, immediately notify the Commissioner in writing.
2. Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

3.2 COORDINATION

- A. Carefully coordinate with all other trades to ensure proper and adequate interface of the work of other trades with the work of this Section.

3.3 PREPARATION

A. Brick

1. Wet brick having ASTM C 67 absorption rates greater than 30 grams per 30 square inches.
2. Except for absorbent units specified to be wetted, lay masonry units dry.

3.4 INSTALLATION

A. General

1. Build walls to the full thickness shown. Build single wythe walls to the actual thickness of the masonry units, using units of nominal thickness shown.
2. Build chases and recesses as shown or required for the work of other trades.
3. Leave openings for equipment to be installed before completion of masonry work. After installation of equipment, complete masonry work to match work immediately adjacent to the opening.
4. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and to properly locate openings, movement type joints, returns and off-sets. Avoid the use of less than half size units at corners, jambs and wherever possible.
5. Lay up walls plumb and true with courses level, accurately spaced and coordinated with other work.
6. Provide templates made of steel studs for plumbing of two story masonry openings.
7. Pattern Bond: Lay exposed masonry patterns as noted on drawings. If not shown, provide running bond. Lay concealed concrete block with all units in a wythe bonded by lapping not less than two (2) inches. Bond and interlock each course of each wythe at corners. Do not use units of less than four (4) inches horizontal face dimensions at corners or jambs.

8. Where possible, masonry walls and partitions shall be built after all overhead ducts, pipes and conduits are in place and tested. Masonry shall be neatly built around the items above. Walls and partitions shall be plumb, true to line and free from defects such as open cells, voids, dry joints and other similar defects. In rooms and spaces scheduled to have concrete block finish, all such surfaces including upper wall surfaces up to termination of structural ceiling in spaces without suspended ceilings, shall be made suitable for paint application. Cutting of openings in walls and partitions in place shall be done only with the approval of the Commissioner.

B. Mortar Bedding and Jointing

1. All joints between bricks shall be completely filled with mortar. Bed joints shall be beveled per BIA recommendations, with the brick then shoved in place. At cavity wall construction, care shall be taken that no excess mortar goes into masonry cavity. Cross joints shall be formed by applying a full coat of mortar to the entire end or the entire side, as the case requires, and then shoving the mortar covered end and/or side of the brick tightly against the bricks previously laid; the practice of buttering the corners of brick and then throwing mortar scrapings into the empty joints will not be permitted. All brick shall be laid without disturbing the brick previously laid. Dry or butt joints will not be permitted. Grouting shall be done only as necessary. Do not slush head joints.
2. Lay masonry walls with 3/8" joints unless otherwise shown on drawings.
3. Tool exposed joints slightly concave. Concealed joints shall be struck flush.
4. Remove masonry units disturbed after laying; clean and reset in fresh mortar. Do not pound corners at jambs to fit stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar and reset in fresh mortar.

- C. Stopping and Resuming Work:** Rake back 1/2 unit length in each course; do not tooth. Clean exposed surfaces of set masonry, wet units lightly (if required) and remove loose masonry units and mortar prior to laying fresh masonry.

D. Built-In Work

1. As the work progresses, build in items specified under this and other Sections of these specifications. Fill in solidly with masonry around built-in items.
2. Mortar in door frames, access doors, louvers and other metal items embedded or built into masonry work solidly with mortar as the masonry units are laid up.
3. Grout under lintels, bearing plates, and steel bearing on masonry with solid bed grout.
4. Sleeves, pipes, ducts and all other items which pass through masonry walls shall be caulked with interior grade sealant meeting requirements of Section 07900, so as to be air tight and prevent air leakage. Refer to Section 07840 for packing of voids in rated masonry walls.

5. Fill vertical cells of masonry units solid with grout which have anchoring, reinforcing rods, supporting or hanging devices embedded in the cell including stone anchors and window or curtain wall anchors.
6. Fill vertical cells of masonry units solid with mortar on each side of door frames to sixteen (16) inches beyond.
7. Unless otherwise noted, fill vertical cells of masonry units solid with grout which are below steel bearing plates, steel beams, and ends of lintels, to eight (8) inches beyond bearing and from floor to bearing.
8. Place wire mesh in horizontal joint below masonry unit cells to be filled with mortar, to prevent mortar from dropping into unfilled cells below.
9. Masonry indicated as being reinforced shall have all voids filled solid with grout. Grout shall be consolidated in place by vibration or other methods which insure complete filling of cells. When the least clear dimension of the grouted cell is less than two (2) inches, the maximum height of grout pour shall not exceed twelve (12) inches. When the least clear dimension is two (2) inches or more, maximum height of grout pour shall not exceed forty-eight (48) inches. When grouting is stopped for one (1) hour or longer, the grout pour shall be stopped 1-1/2" below the top of a masonry unit. Vertical bar reinforcing shall be accurately placed and held in position while being grouted, and shall be in place before grouting starts. All such reinforcing shall have a minimum clear cover of 5/8". Lap all bars a minimum of forty (40) bar diameters and provide steel spacer ties (not to exceed 192 bar diameter) to secure and position all vertical steel and prevent displacement during grouting. Provide continuous horizontal reinforcement embedded in mortar joints every second course.

E. Cutting and Patching

1. All exposed masonry which requires cutting or fitting shall be cut accurately to size with motorized carborundum or diamond saw, producing cut edges.
2. Do not saw cut any masonry openings in face brick construction without Commissioner's approval and after a procedure has been reviewed and approved.
3. Holes made in exposed masonry units for attachment of handrail brackets and similar items shall be neatly drilled to proper size.
4. All masonry which requires patching in exposed work, if approved by Commissioner, shall be patched neatly with mortar to match appearance of masonry as closely as possible and to the Commissioner's satisfaction. Rake back joints and use pointing mortar to match as required.

F. Solid Wall Construction

1. Fill the vertical longitudinal joint between wythes solidly with mortar by parging the in-place wythe and shoving units into the parging.

2. Tie wythes with continuous horizontal reinforcement embedded in mortar joints sixteen (16) inches o.c. vertically.
3. Intersecting and Abutting Walls
 - a. Unless vertical control joints are shown as part of structural frame, provide interlocking masonry bond. Provide starters and special shapes as shown on the drawings to bond these walls.
 - b. In addition to masonry bonding, provide horizontal reinforcement using prefabricated "T" units at interior partitions.

G. Ties and Anchors for Masonry Construction

1. Provide ties and anchors as shown or specified, but not less than one metal tie, spaced not to exceed sixteen (16) inches o.c. horizontally and/or vertically. Provide additional ties within 1'-0" of all openings and spaced not more than 24" apart around perimeter of openings.
2. Anchor masonry to structure complying with the following:
 - a. Provide an open space not less than 1/2" in width between masonry and structural member, unless otherwise shown. Keep open space free of mortar or other rigid materials.

H. Control and Expansion Joints

1. Provide vertical expansion, control and isolation joints in masonry as shown. Build in related items as the masonry work progresses.
2. Brick Veneer Expansion Joint Spacing: Vertical expansion joints in brick veneer construction shall be located maximum 25'-0" o.c. unless otherwise noted in addition to expansion joints located within 2'-0" of each corner of the building.

I. Lintels

1. Install loose steel lintels furnished by Section 055000, allowing eight (8) inch bearing at ends.

Number and Size of Reinforcing Bars Required at Concrete Block Lintels		
Maximum Clearance Span	Wall Width	Rebar No. - Size
2'-0" to 6'-0" 6'-0" to 8'-0"	6"	2 - #3 2 - #4
2'-0" to 6'-0" 6'-0" to 8'-0"	8"	2 - #3 2 - #4

2'-0" to 6'-0" 6'-0" to 8'-0"	12"	3 - #3 3- #4
----------------------------------	-----	-----------------

3.5 FLASHING

- A. General: Install embedded flashing in lintels, ledges, other obstructions to the downward flow of water in the wall, and where indicated.
- B. Prepare masonry surfaces so that they are smooth and free from projections that could puncture flashing.
- C. Flashing shall be placed, generally, at bottoms of cavity wall construction, over all wall openings, window jambs, at sills of window, and in other locations where indicated on the drawings. At concrete spandrel beams and columns the flashing shall be installed with a termination bar. Extreme care shall be exercised in placing the masonry materials not to damage the flashing. Flashing damaged during the masonry erection shall be repaired or replaced by the Contractor at no additional cost to The City of New York. All flashing shall be continuous around building unless otherwise noted on the drawings. Provide flashing of sufficient width to allow flashing to protrude 1" beyond building face.
- D. Where flashing is penetrated by anchors, patch flashings at penetration using adhesive and mastic recommended by the manufacturer to insure watertight seal.
- E. Install flashing in accordance with manufacturer's instructions, using adhesive, primer, thinner, cleaner and mastic as recommended by flashing manufacturer.

3.6 CLEANING, PROTECTION, ADJUSTMENT

- A. Protection
 - 1. The Contractor shall take adequate precautions for the protection of all surfaces against mortar spatter, and shall immediately remove any such spatter should it inadvertently occur, leaving no stain or discoloration.
 - 2. Excess mortar shall be wiped off the masonry surfaces as the work progresses.
 - 3. Wood coverings shall be placed over all such masonry surfaces as are likely to be damaged during the progress of the entire project.
 - 4. Protective measures shall be performed in a manner satisfactory to the Commissioner.
 - 5. Damaged masonry units shall be replaced to satisfaction of the Commissioner.
 - 6. Exterior masonry walls shall be draped with waterproof covering until copings are in place, to prevent water penetration in cavity.
- B. Clean-Up: Upon completion, all exposed masonry shall be thoroughly cleaned following recommendations of the NCMA Technical Notes. Before applying any

cleaning agent to the entire wall, it shall be applied to a sample wall area of approximately 4' x 4' in a location approved by the Commissioner. No further cleaning work may proceed until the sample area has been approved by the Commissioner, after which time the same cleaning materials and method shall be used on the remaining wall area. If stiff brushes and water do not suffice, the surface shall be thoroughly saturated with clear water and then scrubbed with a solution of an approved detergent masonry cleaner, equal to "Vana Trol" made by ProSoCo Inc. or equal made by Diedrich, Dumond Chemicals or approved equal, mixed as per manufacturer's directions, followed immediately by a thorough rinsing with clear water. All lintels and other corrodible parts shall be thoroughly protected during cleaning.

- C. Pointing: Point any defective joint with mortar identical with that specified for that joint

END OF SECTION

SECTION 049000

MASONRY RESTORATION AND CLEANING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the masonry restoration and cleaning as shown on the drawings and/or specified herein, including but not limited to, the following:
 - 1. Cleaning down existing face brick walls of the entire building.
 - 2. Preparation of face brick for applied signage
 - 3. Re-pointing existing face brick walls and caulking surface cracks of the entire building.
 - 4. Replacing existing damaged face brick as indicated on drawings in kind (color, texture, etc.).
 - 5. Providing reinforced concrete masonry unit infill as indicated on the drawings.
 - 6. Sealing face brick
 - 7. Replacement of sills and lintels

1.3 RELATED SECTIONS

- A. Construction Waste Management and Disposal - Section 017419
- B. Sustainable Design Requirements (LEED Building) - Section 018113

- C. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3
- D. Construction IAQ Requirements - Section 018119
- E. Unit masonry - Section 042000.
- F. Joint Sealers - Section 079000.
- G. Sheet Metal Flashing – Section 076200
- H. Flexible Flashing – Section 076500
- I. Aluminum Framed Entrance and Storefront – Section 084113
- J. Aluminum Windows – Section 085113
- K. Painting and Finishing – Section 099000
- L. Breathable Masonry Coating – Section 099200

1.4 QUALITY ASSURANCE

- A. Field-Constructed Mock-Ups: Prior to start of general masonry restoration, prepare the following sample panels on the building where directed by Commissioner. Obtain Commissioner's acceptance of visual qualities before proceeding with the work. Retain acceptable panels in undisturbed condition, suitably marked, during construction as a standard for judging completed work.
- B. Removal of Outer Brick:
 - 1. Remove a sample area of veneer masonry approximately 5 feet wide and 15 feet high including at least one window lintel in the presence of the Commissioner to demonstrate techniques and procedures of brick removal.
 - 2. Repointing of Interior Wythes: Prepare sample areas approximately five feet wide by five feet high wide demonstrating methods and quality of workmanship expected in removing mortar from joints and in pointing mortar joints.
 - 3. Lintel Repair: Prepare the lintel to be repaired; scrape, clean, paint and apply flashing materials as required to gain Commissioner's approval.
 - 4. Masonry Replacement: Prepare sample panels of approximately 5 feet wide and 5 feet high for each type of brick and bluestone masonry material indicated to be rebuilt or replaced. Use mortar and finishing techniques approved in Mockup (see Section 042000) Erect sample panels to demonstrate the quality of materials and in-place workmanship.
- C. Other activities (steel repairs, window opening preparation, window flashing installation) when first encountered will be subject to review and acceptance by the Commissioner and/or Engineer. Allow for adequate time in the work schedule to accommodate these reviews.
 - 1. Cleaning: Demonstrate materials and methods to be used for cleaning each type of masonry surface and condition on sample panels of approximately 25 sq. ft. in area.

- a. Test adjacent non-masonry materials for possible reaction with cleaning materials. Use manufacturer's application instructions.
- b. Allow waiting period not less than seven (7) calendar days, after completion of sample cleaning to permit study of sample panels for negative reactions.
- c. Keep test panels available for comparison throughout the cleaning phase of work.

1.5 SUBMITTALS

- A. Product Data: Submit manufacturers' technical data for each product indicated including recommendations for their application and use and VOC compliance. Include test reports and certifications substantiating that products comply with requirements.
- B. Restoration Program: Submit written program for each phase of restoration process including protection of surrounding materials on building and site during operations. Describe in detail materials, methods and equipment to be used for each phase of restoration work.
- C. Mock ups:
 1. Repointing: Prepare two (2) separate sample areas of approximately 3' high by 6' wide for each type of repointing required, one for demonstrating methods and quality of workmanship expected in removal of mortar from joints and the other for demonstrating quality of materials and workmanship expected in pointing mortar joints.
 2. Provide a 24" x 24" mock-up of mortar color.
- D. LEED BUILDING Submittal Requirements:

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

 1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Sustainable Design Requirements (LEED Building) - Section 018113 of these specifications.
 2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
 3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
 3. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the LEED Consultant for review.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Carefully pack, handle, and ship masonry units and accessories strapped together in suitable packs or pallets or in heavy cartons. Unload and handle to prevent chipping and breakage.
- B. Deliver other materials to site in manufacturer's original and unopened containers and packaging, bearing labels as to type and names of products and manufacturers.
- C. Protect masonry restoration materials during storage and construction from wetting by rain, snow or ground water, and from staining or intermixture with earth or other types of materials.
- D. Protect grout, mortar and other materials from deterioration by moisture and temperature. Store in a dry location or in waterproof containers. Keep containers tightly closed and away from open flames. Protect liquid components from freezing. Comply with manufacturer's recommendations for minimum and maximum temperature requirements for storage.

1.7 PROJECT CONDITIONS

- A. Clean masonry surfaces only when air temperatures are 40 deg. F. and above and will remain so until masonry has dried out, but for not less than seven (7) days after completion of cleaning.
- B. Do not repoint mortar joints or repair masonry unless air temperatures are between 40 deg. F. and 80 deg. F. and will remain so for at least forty-eight (48) hours after completion of work.
- C. Prevent grout or mortar used in repointing and repair work from staining face of surrounding masonry and other surfaces. Remove immediately grout and mortar in contact with exposed masonry and other surfaces.
- D. Protect sills, ledges and projections from mortar droppings.

1.8 SEQUENCING/SCHEDULING

- A. Perform masonry restoration work in the following sequence:
 1. Repair existing masonry including replacing existing masonry with new masonry materials.
 2. Rake-out existing mortar from joints indicated to be repointed.
 3. Repoint existing mortar joints of masonry indicated to be restored.

4. Clean existing masonry surfaces.

PART 2 PRODUCTS

2.1 MASONRY MATERIALS

- A. Provide face brick conforming to the requirements of Section 04200.
- B. Provide 8" x 16" concrete masonry units for infill as indicated on drawings.
- C. Provide #5 rebar vertical reinforcement and steel horizontal ladder reinforcement at concrete masonry unit infill and as indicated on the drawings.
- D. For mortar materials, conform to the requirements of Section 04200.

2.2 CLEANING MATERIALS AND EQUIPMENT

- A. Product selected for cleaning is to be from the same manufacturer and clearly compatible with the breathable masonry coating specified elsewhere.
- B. Water for Cleaning: Clean, potable, free of oils, acids, alkalis, salts, and organic matter.
- C. Alkaline Prewash Cleaner: Manufacturer's standard alkaline cleaner for prewash applications only which are followed by acidic cleaner of type indicated for afterwash.
 1. Product: Subject to compliance with manufacturer and field requirements, provide Basis of Design: "Sure Klean 766 Limestone & Masonry Prewash" from ProSoCo, Inc. or equal by Dietrich, Dumond or approved equal.
- D. Acidic Cleaner: Manufacturer's standard strength acidic masonry restoration cleaner composed of hydrofluoric acid blended with other acids including trace of phosphoric acid and combined with special wetting systems and inhibitors.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Basis of Design: "Enviro Klean EK Restoration Cleaner", ProSoCo, Inc.
 - b. "Diedrich 101 Masonry Restorer", Diedrich Chemicals.
 - c. "Safe n' Easy Ultimate Stone and Masonry Cleaner" Dumond Chemicals, Inc.
 - d. Or approved equal.
- E. Liquid Strippable Masking Agent: Manufacturer's standard liquid, film forming, strippable masking material for protecting glass, metal and polished stone surfaces from damaging effect of acidic and alkaline masonry cleaners.
 1. Products: Subject to compliance with requirements provide one of the following:
 - a. "Diedrich Acid Guard", Diedrich Chemicals.
 - b. "Sure Klean Acid Stop", ProSoCo, Inc.
 - c. Dumond Chemicals, Inc.

d. Or approved equal.

F. Spray Equipment: Provide equipment for controlled spray application of water and chemical cleaners, at rates required by the manufacturer, measured at spray tip, and for volume.

1. For spray application of chemical cleaners provide low-pressure tank or chemical pump suitable for chemical cleaner indicated, equipped with cone-shaped spray-tip.
2. For spray application of water provide fan-shaped spray-tip which disperses water at angle of not less than 15 degrees.

2.3 MORTAR MIXES

A. Measuring and Mixing: Measure cementitious and aggregate material in a dry condition by volume or equivalent weight. Do not measure by shovel, use known measure. Mix materials in a clean mechanical batch mixer.

1. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding any water. Then mix again adding only enough water to produce a damp, unworkable mix which will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 1-to-2 hours. Add remaining water in small portions until mortar of desired consistency is reached. Use mortar within thirty (30) minutes of final mixing; do not retemper or use partially hardened material.

B. Colored Mortar: Produce mortar of color required by use of selected coloring agent.

C. Do not use admixtures of any kind in mortar, other than colorant.

D. Mortar Proportions

1. Pointing Mortar for Brick: One part white Portland cement, 2 parts lime and 6 parts colored mortar aggregate, Type N. Add colored mortar pigment to product mortar colors required to match.
2. Rebuilding Mortar: Comply with ASTM C 270, Proportion Specification, Type N, with cementitious material content limited to Portland cement-lime and coloring agent.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where masonry restoration and cleaning are to be performed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected by the Contractor in a manner acceptable to the Commissioner.

3.2 PROTECTION

- A. General: Comply with recommendations of manufacturers of chemical cleaners for protecting building surfaces against damage from exposure to their products.
- B. Protect persons, motor vehicles, surrounding surfaces of building whose masonry surfaces are being restored, building site, and surrounding buildings from injury resulting from masonry restoration work.
 - 1. Prevent chemical cleaning solutions from coming into contact with pedestrians, motor vehicles, landscaping, buildings and other surfaces which could be injured by such contact.
 - 2. Do not clean masonry during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
 - 3. Dispose of run-off from cleaning operations by legal means and in manner which prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.
 - 4. Erect temporary protection covers over pedestrian walkways and at points of entrance and exit for persons and vehicles which must remain in operation during course of masonry restoration work.
- C. Protect glass, unpainted metal trim and polished stone from contact with acidic chemical cleaners by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape. Apply masking agent to comply with manufacturer's recommendations. Do not apply liquid masking agent to painted or porous surfaces.

3.3 CLEANING EXISTING MASONRY, GENERAL

- A. Before applying, read "Preparation" and "Safety Information" sections in the Manufacturer's Product Data Sheet for. Do not dilute or alter
- B. Proceed with cleaning in an orderly manner; work from top to bottom of each scaffold width and from one end of each elevation to the other.
- C. Use only those cleaning methods and procedures indicated by manufacturer for each masonry material and location.
- D. Perform each cleaning method indicated in a manner which results in uniform coverage of all surfaces, including corners, moldings, interstices and which produces an even effect without streaking or damage to masonry surfaces.
- E. Rinse off chemical residue and soil by working upwards from bottom to top of each treated area at each stage or scaffold setting.
- F. Water Application Methods: Prior to chemical cleaning, apply water application to mock-ups by spray at various pressures to determine if masonry surfaces can be cleaned adequately and to the Commissioner's satisfaction in this manner. If water applications prove ineffective, proceed with chemical cleaners.

G. Chemical Cleaner Application Methods: Apply chemical cleaners to masonry surfaces to comply with chemical manufacturer's recommendations. Do not allow chemicals to remain on surface for periods longer than that indicated or recommended by manufacturer.

1. For hard to remove dirt or grime, apply pre-wash cleaner prior to application of chemical cleaner; follow manufacturer's instructions.

3.4 BRICK REMOVAL AND REBUILDING

A. Brick Removal

1. Carefully remove by hand any brick which are damaged, spalled or deteriorated. Cut out full units from joint to joint and in manner to permit replacement with full size units.
2. Support and protect masonry indicated to remain which surrounds removal area.
3. Salvage as many whole, undamaged bricks as possible.
4. Remove mortar, loose particles and soil from salvaged brick by cleaning with brushes and water. Store brick for reuse.
5. Clean remaining brick at edges of removal areas by removing mortar, dust, and loose debris in preparation for rebuilding.

B. Brick Rebuilding

1. Install new or salvaged brick to replace removed brick. Fit replacement units into bonding and coursing pattern of existing brick. If cutting is required use motor driven saw designed to cut masonry with clean, sharp unchipped edges.
2. Lay replacement brick with completely filled bed, head and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet clay brick which have ASTM C 67 initial rates of absorption (suction) of more than 30 grams per 30 sq. in. per minute. Use wetting methods which ensure that units are nearly saturated but surface dry when laid. Maintain joint width for replacement units to match existing.
3. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork.

3.5 REPOINTING EXISTING MASONRY

A. Joint Raking

1. Rake out mortar from joints to depths equal to 2-1/2 times their widths but not less than 1/2" nor less than that required to expose sound, unweathered mortar.
2. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum or flush joints to remove dirt and loose debris.

3. Do not spall edges of masonry units or widen joints. Replace any masonry units which become damaged.
 - a. Cut out old mortar by hand with chisel and mallet.
 - b. Power operated rotary hand saws and grinders will be permitted but only on specific written approval of Commissioner based on submission by Contractor of a satisfactory quality control program and demonstrated ability of operators to use tools without damage to masonry. Quality control program shall include provisions for supervising performance and preventing damage due to worker fatigue.

B. Joint Pointing

1. Rinse masonry joint surfaces with water to remove any dust and mortar particles. Time application of rinsing so that, at time of pointing, excess water has evaporated or run off, and joint surfaces are damp but free of standing water.
2. Apply first layer of pointing mortar to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8" until a uniform depth is formed. Compact each layer thoroughly and allow to become thumbprint-hard before applying next layer.
3. After joints have been filled to a uniform depth, place remaining pointing mortar in three (3) layers with each of first and second layers filling approximately 2/5 of joint depth and third layer the remaining 1/5. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing bricks have rounded edges recess final layer slightly from face. Take care not to spread mortar over edges onto exposed masonry surfaces, or to featheredge mortar.
4. When mortar is thumbprint hard, tool joints to match original appearance of joints, unless otherwise indicated. Remove excess mortar from edge of joint by brushing.
5. Cure mortar by maintaining in a damp condition for not less than seventy-two (72) hours.
6. Where repointing work precedes cleaning of existing masonry allow mortar to harden not less than thirty (30) days before beginning cleaning work.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 051200

STRUCTURAL STEEL

PART 1 - GENERAL

1.1 SUMMARY

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.
- C. This Section includes structural steel and grout.

1.2 PERFORMANCE REQUIREMENTS

- A. LEED BUILDING Performance Criteria: The following criteria are REQUIRED for the products included in this section:
 - 1. Metal members (*and/or steel deck, steel tubing, framing, metal stairs, etc.*) shall contain a minimum of 35% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Structural steel shall contain 75%. Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.
 - 2. Metal members (*and steel deck, steel tubing, framing, metal stairs, etc.*) fabricated within, and containing raw materials extracted within, 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements above.
 - 3. Adhesives or sealants used for work in this section shall meet the requirements of Section 018113.3: Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
 - 4. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.

- B. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator to withstand ASD-service loads indicated and comply with other information and restrictions indicated.

1. Select and complete connections using schematic details indicated and AISC's "Manual of Steel Construction, Allowable Stress Design," Part 4.
2. Engineering Responsibility: Fabricator's responsibilities include using a qualified professional engineer, registered in the State of the Project, to prepare structural analysis data for structural steel connections.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.

- B. LEED BUILDING Submittal Requirements:

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s) and the location (source) of the raw materials used to manufacture the product(s)
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
 3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
 4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
- B. Shop Drawings: Show fabrication of structural-steel components. For structural steel connections include structural analysis data signed and sealed by the qualified professional engineer, registered in the State of the Project, responsible for their preparation.

- C. Welding certificates.
- D. Mill test reports.
- E. Source quality-control test reports.

1.4 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."
- B. Comply with applicable provisions of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- C. Preinstallation Conference: Attend project meeting at the site prior to steel erection.
- D. LEED BUILDING Performance Criteria:
The following criteria are REQUIRED for the products included in this section:
 - 1. Metal members shall contain a minimum of 35% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Structural steel shall contain 75%. Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.
 - 2. Metal members fabricated within, and containing raw materials extracted within, 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements above.
 - 3. Adhesives or sealants used for work in this section shall meet the requirements of Section 018113.3 : Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
 - 4. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 60 percent.
- B. W-Shapes: ASTM A 992.
- C. Channels, Angles, M, S-Shapes: ASTM A 36.
- D. Plate and Bar: ASTM A 36.

- E. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.
- F. Steel Pipe: ASTM A 53, Type E or S, Grade B.
- G. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 & ASTM A 490, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.
 - 1. Finish: Plain, except where indicated to be hot-dip zinc coated, ASTM A 153/A 153M, Class C.
 - 2. Direct-Tension Indicators: ASTM F 959, Type 325 compressible-washer type.
 - a. Finish: Plain, except where indicated to be mechanically deposited zinc coated, ASTM B 695, Class 50.
- B. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1, Type B.
- C. Unheaded/Headed Anchor Rods: ASTM F 1554, Grade 36.
 - 1. Unheaded Anchor Configuration: Hooked.
 - 2. Finish: Plain.
- D. Threaded Rods: ASTM A 193.
 - 1. Finish: Plain.

2.3 PRIMER

- A. Primer: SSPC-Paint 25, Type II, iron oxide, zinc oxide, raw linseed oil, and alkyd.
- B. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer.

2.4 GROUT

- A. Metallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time. Minimum 28-day compressive strength of 5000 psi.
- B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time. Minimum 28-day compressive strength of 5000 psi.

2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
- B. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

2.7 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 to be high-strength bolted with slip-critical connections.
 - 4. Surfaces to receive sprayed fire-resistive materials.
 - 5. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 - 1. SSPC-SP 2, "Hand Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a dry film thickness of not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.8 SOURCE QUALITY CONTROL

- A. City of New York will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports. Comply with testing and inspection requirements of Part 3, Article "Field Quality Control."

- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1 for stud welding.

PART 3 - EXECUTION

3.1 ERECTION

- A. Examination: Verify elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments, with steel erector present, for compliance with requirements.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Set structural steel accurately in locations and to elevations indicated and according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
- C. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.
 - 1. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of base plate.
 - 3. 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 base or bearing plate before packing with grout.
 - 4. Promptly pack grout solidly between bearing surfaces and base or bearing plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- D. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.2 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

1. Comply with AISC's "Code of Standard Practice for Steel Buildings and Bridges" and "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design" for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: City of New York will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1.
 1. In addition to visual inspection, field welds will be tested according to AWS D1.1 and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.
- D. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

END OF SECTION 05120

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 053100

STEEL DECK

PART 1 - GENERAL

1.1 SUMMARY

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.
- C. This Section includes the following:
 - 1. Roof deck.
 - 2. Non-composite form deck.

1.2 PERFORMANCE REQUIREMENTS

- A. The following criteria are REQUIRED for the products included in this section:
 - 1. Metal members (*and/or steel deck, steel tubing, framing, metal stairs, etc.*) shall contain a minimum of 35% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Structural steel shall contain 75%. Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.
 - 2. Metal members (*and steel deck, steel tubing, framing, metal stairs, etc.*) fabricated within, and containing raw materials extracted within, 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements above.
 - 3. Adhesives or sealants used for work in this section shall meet the requirements of Section 018113.3 Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
 - 4. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.

1.3 SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings: Show layout and types of deck panels, anchorage details, conditions requiring closure strips, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.
- C. Product certificates.
- D. Welding certificates.
- E. LEED BUILDING Submittal Requirements:
The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 - 1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s) and the location (source) of the raw materials used to manufacture the product(s)
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
 - 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
 - 3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
 - 4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed steel deck installation work similar in material, design, and extent to that indicated for this project, and whose work has resulted in construction with a record of successful in-service performance.

- B. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."
- C. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance Ratings: Indicated by design designations of applicable testing and inspecting agency.
 - 2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- D. LEED BUILDING Performance Criteria:
The following criteria are REQUIRED for the products included in this section:
 - 1. Metal members *and/or steel deck, steel tubing, framings, etc*) shall contain a minimum of 35% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Structural steel shall contain 75%. Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.
 - 2. Metal members *and steel deck, steel tubing, framing*) fabricated within, and containing raw materials extracted within, 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements above.
 - 3. Adhesives or sealants used for work in this section shall meet the requirements of Section 018113.3 : Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
 - 4. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.
- C. Do not store materials on structure in a manner that might cause distortion or damage to members of supporting structure.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. ASC Profiles, Inc.
 2. Canam Steel Corp.; The Canam Manac Group.
 3. Consolidated Systems, Inc.
 4. DACS, Inc.
 5. D-Mac Industries Inc.
 6. Epic Metals Corporation.
 7. Marlyn Steel Decks, Inc.
 8. New Millennium Building Systems, LLC.
 9. Nucor Corp.; Vulcraft Division.
 10. Roof Deck, Inc.
 11. United Steel Deck, Inc.
 12. Valley Joist; Division of EBSCO Industries, Inc.
 13. Verco Manufacturing Co.
 14. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.
 15. Approved other manufacturers.

2.2 ROOF DECK

- A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:
1. Galvanized Steel Sheet: ASTM A 653, Structural Steel (SS), Grade 40, G90 zinc coating.
 2. Deck Profile: As indicated on the drawings.
 3. Profile Depth: As indicated on the drawings.

2.3 NONCOMPOSITE FORM DECK

- A. Noncomposite Steel Form Deck: Fabricate ribbed-steel sheet noncomposite form-deck panels to comply with "SDI Specifications and Commentary for Noncomposite Steel Form Deck," in SDI Publication No. 30, with the minimum section properties indicated, and with the following:
1. Galvanized Steel Sheet: ASTM A 653, Structural Steel (SS), Grade 33, G90 zinc coating.
 2. Profile Depth: 9/16 inch.
 3. Design Uncoated-Steel Thickness: 0.0358 inch.
 4. Span Condition: Triple span.
 5. Side Laps: Interlocking seam.

2.4 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi , not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, requirements in this Section, and as indicated.
- B. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- C. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- D. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- E. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- F. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- G. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.
- H. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches.

- I. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld or mechanically fasten flanges to top of deck. Space welds or mechanical fasteners not more than 12 inches apart with at least one weld or fastener at each corner.
 - 1. Install reinforcing channels or zees in ribs to span between supports and weld or mechanically fasten.
- J. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.
 - 1. Weld cover plates at changes in direction of roof-deck panels, unless otherwise indicated.

3.2 FIELD QUALITY CONTROL

- A. Testing Agency: City of New York will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports. The following inspections shall be performed:
 - 1. Perform 100% visual inspection of deck installation, including deck accessories.
 - 2. Verify type of deck complies with design requirements.
 - 3. Check size and location of weld attaching deck to supporting frame.
 - 4. Check welding of side laps of adjacent deck units.
 - 5. Verify installation of closures, flashings, cover plates, and other required accessories
- B. Field welds will be subject to inspection.
- C. Testing agency will report inspection results promptly and in writing to Contractor and Commissioner.
- D. Remove and replace work that does not comply with specified requirements.
- E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.3 REPAIRS

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces or top surface of prime-painted deck immediately after installation, and apply repair paint.

END OF SECTION 053100

SECTION 054000

COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

B. LEED BUILDING - GENERAL REQUIREMENTS:

The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

- A. This Section includes the following:

1. Floor joist framing.
2. Exterior load-bearing wall framing.

B. Related Work

1. Construction Waste Management and Disposal - Section 017419
2. Sustainable Design Requirements (LEED Building) - Section 018113
3. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3
4. Construction IAQ Requirements - Section 018119

1.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated:

- a. Dead Loads: See Plans.
 - b. Live Loads: See Plans.
 - c. Wind Loads: Per New York City Building Code.
2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
- a. Floor Joist Framing: Vertical deflection of 1/480 for live loads and 1/360 for total loads of the span.
 - b. Exterior Load-Bearing Wall Framing: Horizontal deflection of 1/720 of the wall height.
- B. LEED BUILDING Performance Criteria:
The following criteria are REQUIRED for the products included in this section:
1. Metal members (*and/or steel deck, steel tubing, framing, metal stairs, etc.*) shall contain a minimum of 35% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Structural steel shall contain 75%. Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.
 2. Metal members (*and steel deck, steel tubing, framing, metal stairs, etc.*) fabricated within, and containing raw materials extracted within, 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements above.
 3. Adhesives or sealants used for work in this section shall meet the requirements of Section 018113.3: Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
 4. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.

1.3 SUBMITTALS

- A. Product Data: For each type of product and accessory indicated.
- B. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
 1. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer registered in the State of New York and hired by the contractor.
- C. Welding certificates.

- D. Qualification data.
- E. Product test reports.
- F. Research/evaluation reports.

G. LEED BUILDING Submittal Requirements:

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s) and the location (source) of the raw materials used to manufacture the product(s)
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

1.4 QUALITY ASSURANCE

- A. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements.
- B. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code--Sheet Steel."
- C. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

- D. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."
1. Comply with AISI's "Standard for Cold-Formed Steel Framing - Truss Design."
 2. Comply with AISI's "Standard for Cold-Formed Steel Framing - Header Design."
- E. Comply with AISI's "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."
- F. LEED BUILDING Performance Criteria:
The following criteria are REQUIRED for the products included in this section:
1. Metal members and/or steel framing shall contain a minimum of 35% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Structural steel shall contain 75%. Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.
 2. Metal members and/or steel framing fabricated within, and containing raw materials extracted within, 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements above.
 3. Adhesives or sealants used for work in this section shall meet the requirements of Section 018113.3 : Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
 4. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
- B. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
1. Grade: As required by structural performance.
 2. Coating: G90 or equivalent.

2.2 FLOOR JOIST FRAMING

- A. Steel Joists: Manufacturer's standard C-shaped steel joists, of web depths indicated, unpunched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0428 inch.
 - 2. Flange Width: 1-5/8 inches, minimum.

2.3 Wall Framing: Manufacturer's standard steel studs, of web depths indicated, with stiffened flanges, complying with ASTM C 955, and as follows:

- 1. Minimum Uncoated-Steel Thickness: 0.0428 inch.
- 2. Flange Width: 1-5/8 inches, minimum.

2.4 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members, unless otherwise indicated.
- B. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- C. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.
- D. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
- E. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.
- F. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

2.5 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A 780.

- B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Shims: Load bearing, high-density multimonomer plastic, nonleaching.
- D. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.
- B. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

3.2 INSTALLATION, GENERAL

- A. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.
- B. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.
- C. Install framing members in one-piece lengths.
- D. Install temporary bracing and supports to secure framing and support loads comparable in intensity 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.
- E. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.
- F. Install insulation, specified in Division 7 Section "Building Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- G. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

- H. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.3 JOIST INSTALLATION

- A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.
- B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.
1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches.
 2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections as indicated on Shop Drawings.
- C. Space joists not more than 2 inches from abutting walls, and as follows:
1. Joist Spacing: 16 inches.
- D. Frame openings with built-up joist headers consisting of joist and joist track, nesting joists, or another combination of connected joists if indicated.
- E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated on Shop Drawings.
1. Install web stiffeners to transfer axial loads of walls above.
- F. Install bridging at intervals indicated on Shop Drawings. Fasten bridging at each joist intersection as follows:
1. Bridging: Joist-track solid blocking of width and thickness indicated, secured to joist webs.
 2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.
- G. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.
- H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

3.4 Load-Bearing Wall Installation:

- A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends. Squarely seat studs against webs of top and bottom tracks. Space studs as indicated, set plumb, align, and fasten both flanges of studs to top and bottom tracks.
- B. Align studs vertically where wall-framing continuity is interrupted by floor framing. Where studs cannot be aligned, continuously reinforce track to transfer loads.
- C. Align floor and roof framing over studs. Where framing cannot be aligned, continuously reinforce track to transfer loads.
- D. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.
- E. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.
- F. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings.
- G. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.
- H. Install horizontal bridging in stud system, spaced as indicated on Shop Drawings. Fasten at each stud intersection.
- I. Install miscellaneous framing and connections, including supplementary framing, blocking, bracing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 FIELD QUALITY CONTROL

- A. Testing: 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. Testing agency will report test results promptly and in writing to Contractor and Commissioner.
- D. Remove and replace work where test results indicate that it does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.6 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05400

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 055000

MISCELLANEOUS METALS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the miscellaneous metal work as indicated on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Rough hardware.
 - 2. Vertical steel ladders.
 - 3. Interior and exterior steel pipe and ornamental handrails and railings.
 - 4. Custom-fabricated stainless steel utility sinks
 - 5. Loose steel lintels.
 - 6. Light steel framing and supports, not included as part of work of other trades.
 - 7. Sleeves in concrete walls and slabs.
 - 8. Clean existing steel lintels.
 - 9. Steel framing, bracing, supports, anchors, bolts, shims, fastenings, and all other supplementary parts indicated on drawings or as required to complete each item of work of this Section.

10. Prime painting, touch-up painting, galvanizing and separation of dissimilar metals for work of this Section.
11. Cutting, fitting, drilling and tapping work of this Section to accommodate work of other Sections and of concrete, masonry or other materials as required for attaching and installing work of this Section.

1.3 RELATED SECTIONS

- A. Construction Waste Management and Disposal - Section 017419
- B. Sustainable Design Requirements (LEED Building) - Section 018113
- C. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3
- D. Construction IAQ Requirements - Section 018119
- E. Masonry Restoration and Cleaning – Section 049000
- F. Structural steel - Section 051200.
- G. Carpentry – Section 062000
- H. Architectural Woodwork – Section 064000
- I. Glass and Glazing – Section 088000
- J. Painting and Finishing- Section 099100.
- K. Signage- Section 104000
- L. Related work in Divisions 21-23 and 26-28

1.4 QUALITY ASSURANCE

A. LEED BUILDING Performance Criteria:

The following criteria are REQUIRED for the products included in this section:

1. Metal members shall contain a minimum of 35% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Structural steel shall contain 75%. Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.
2. Metal members fabricated within, and containing raw materials extracted within, 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements above.
3. Adhesives or sealants used for work in this section shall meet the requirements of

Section 018113.3 : Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.

4. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.
- B. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress; allow for trimming and fitting where taking field measurements before fabrication might delay work.
- C. Shop Assembly: Pre-assemble 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 re-assembly and coordinated installation.
- D. Reference Standards: The work is subject to requirements of applicable portions of the following standards:
 1. "Manual of Steel Construction," American Institute of Steel Construction.
 2. AWS D1-1 "Structural Welding Code," American Welding Society.
 3. SSPC SP-3 "Surface Preparation Specification No. 3, Power Tool Cleaning," Steel Structures Painting Council.
 4. SSPC PA-1 "Painting Application Specification," Steel Structures Painting Council.
 5. "Handbook on Bolt, Nut and Rivet Standards," Industrial Fasteners Institute.
- E. Steel Materials: For steel to be hot dip-galvanized, provide steel chemically suitable for metal coatings complying with the following requirements: carbon below 0.25 percent, silicon below 0.24 percent, phosphorous below 0.05 percent, and manganese below 1.35 percent. Notify galvanizer if steel does not comply with these requirements to determine suitability for processing.
- F. Engage the services of a galvanizer who has demonstrated a minimum of three (3) years' experience in the successful performance of the processes outlined in this specification in the facility where the work is to be done and who will apply the galvanizing and coatings within the same facility as outlined herein. The Commissioner has the right to inspect and approve or reject the galvanizer/galvanizing facility.
- G. The galvanizer/galvanizing facility must have an ongoing Quality Control/Quality Assurance program which has been in effect for a minimum of three years and shall provide the Commissioner with process and final inspection documentation. The galvanizer/galvanizing facility must have an on-premise testing facility capable of measuring the chemical and metallurgical composition of the galvanizing bath and pickling tanks.

- H. Inspection and testing of hot-dip galvanized coating shall be done under the guidelines provided in the American Hot-Dip Galvanizers Association (AGA) publication "Inspection of Products Hot-Dip Galvanized After Fabrication."

1.5 PERFORMANCE STANDARDS

- A. Stairs and railings shall be constructed to conform to the following performance standards:
1. Stairs and platforms shall support a live load of one hundred (100) psf and a concentrated live load of three hundred (300) lbs. and shall have a live load deflection limited to 1/360 of the span. Loads shall not apply simultaneously.
 2. Railings shall be designed to resist loads as specified in Article 3, Section 27-558 of the New York City Building Code.

1.6 SUBMITTALS

- A. Manufacturer's Literature: Submit manufacturer's specifications, load tables, dimension diagrams, anchor details and installation instructions for products to be used in the fabrication of miscellaneous metal work, including paint products.
- B. Shop Drawings: Shop drawings for the fabrication and erection of all assemblies of miscellaneous iron work which are not completely shown by manufacturer's data sheets. Include plans and elevations at not less than 1" to 1'-0" scale, and include details of sections and connections at not less than 3" to 1'-0" scale. Show anchorage and accessory items.
- C. Engineering Data
1. Before any ladders and railings are fabricated, submit engineering data drawings to the Commissioner for review indicating how performance standards specified here shall be met. The Contractor is responsible for the structural design and supports for these systems and must show his proposed systems on these drawings.
 2. These drawings must show all load conditions and design calculations relative to connections, fastening devices and anchorage, as well as size and gauge of members. Calculations and drawings must be prepared by a Structural Engineer licensed in the State of New York and shall be signed and sealed by this Engineer.
- D. Welding shall be indicated on shop drawings using AWS symbols and showing length, size and spacing (if not continuous). Auxiliary views shall be shown to clarify all welding. Notes such as 1/4" weld, weld and tack weld are not acceptable.
- E. Certification: For items to be hot-dip galvanized, identify each item galvanized and to show compliance of application. The Certificate shall be signed by the galvanizer and shall contain a detailed description of the material processed and the ASTM standard used for the coating and, the weight of the coating. In addition, and as attachment to Certification, submit reports of testing and inspections indicating compliance with the provisions of this Section.

F. LEED BUILDING Submittal Requirements:

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s) and the location (source) of the raw materials used to manufacture the product(s)
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

PART 2 PRODUCTS

2.1 MATERIALS

A. Metals

1. Metal Surfaces, General: For fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.
2. Steel Plates, Shapes and Bars: ASTM A 36.

3. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 316L.
 4. Stainless-Steel Bars and Shapes: ASTM A 276, Type 316L.
 5. Steel Bar Grating: ASTM A 1011 or ASTM A 36.
 6. Steel Tubing: Cold formed, ASTM A 500; or hot rolled, ASTM A 501.
 7. Structural Steel Sheet: Hot rolled, ASTM A 570; or cold rolled, ASTM A 611, Class 1; of grade required for design loading.
 8. Galvanized Structural Steel Sheet: ASTM A 924, of grade required for design loading. Coating designation G90.
 9. Steel Pipe: ASTM A 53, type and grade as selected by fabricator and as required for design loading; black finish unless galvanizing is indicated; standard weight (Schedule 40), unless otherwise indicated.
 10. Gray Iron Castings: ASTM A 48, Class 30, unless another class is indicated or required by structural loads.
 11. Malleable Iron Castings: ASTM A 47, grade as selected by fabricator.
 12. Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.
 13. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A 47, or cast steel, ASTM A 27. Provide bolts, washers and shims as required, hot-dip galvanized, ASTM A 153.
 14. Stainless Steel: ASTM A276, Type 316, No. 4 brushed finish.
 15. Stainless steel welded wire mesh guardrail:
 - a. Basis of Design: Banker Wire Inc, M22-27
 - b. McNichols
 - c. Cambridge Architectural
 - d. or approved equal
 16. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6.
 17. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.
 18. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
 19. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.
- B. Grout: Non-shrink, non-metallic grout conforming to the requirements of Section 03300.

C. Fasteners

1. General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required.
2. Bolts and Nuts: Regular hexagon head type, ASTM A 307, Grade A.
3. Anchor Bolts: ASTM F 1554, Grade 36.
4. Lag Bolts: ASME B18.2.1.
5. Machine Screws: ASME B18.6.3.
6. Plain Washers: Round, carbon steel, ASME B18.22.1.
7. Masonry Anchorage Devices: Expansion shields, FS FF-S-325.
8. Toggle Bolts: Tumble-wing type, FS FF-B-588, type, class and style as required.
9. Lock Washers: Helical spring type carbon steel, ASME B18.21.1.

D. Shop Paint: Shop prime all non-galvanized miscellaneous metal items using Series 88 Azoron Primer made by Tnemec or approved equal.

E. Bituminous Paint: Cold applied asphalt emulsion complying with ASTM D 1187.

F. Galvanize Repair Coating: For touching up galvanized surfaces after erection, provide repair coating conforming to ASTM A 870 equal to Z.R.C. Cold Galvanizing Compound made by Z.R.C. Chemical Products Co. or approved equal.

2.2 PRIME PAINTING

A. Scope: All ferrous metal (except galvanized steel) shall be cleaned and shop painted with one coat of specified ferrous metal primer. No shop prime paint required on galvanized steel or aluminum work.

B. Cleaning: Conform to Steel Structures Painting Council Surface Preparation Specification SP 3 (latest edition) "Power Tool Cleaning" for cleaning of ferrous metals which are to receive shop prime coat.

C. Application

1. Apply shop prime coat immediately after cleaning metal. Apply paint in dry weather or under cover. Metal surfaces shall be free from frost or moisture when painted. Paint all metal surfaces including edges, joints, holes, corners, etc.
2. Paint surfaces which will be concealed after shop assembly prior to such assembly. Apply paint in accordance with approved paint manufacturer's printed instructions, and the use of any thinners, adulterants or admixtures shall be only as stated in said instructions.

3. Paint shall uniformly and completely cover the metal surfaces, 2.0 mils minimum dry film thickness. No work shall be shipped until the shop prime coat thereon has dried.
- D. Touch-Up: In the shop, after assembly and in the field, after installation of work of this Section, touch-up damaged or abraded portions of shop prime paint with specified ferrous metal primer.
- E. Apply one shop coat to fabricated metal items, except apply two (2) coats of paint to surfaces inaccessible after assembly or erection. Change color of second coat to distinguish it from the first.

2.3 GALVANIZING

- A. Scope: All ferrous metal exposed to the weather, and all ferrous metals indicated on drawings or in specifications to be galvanized, shall be cleaned and then hot-dipped galvanized after fabrication as provided by Duncan Galvanizing or approved equal.
- B. Avoid fabrication techniques that could cause distortion or embitterment of steel items to be hot-dip galvanized. Fabricator shall consult with hot-dip galvanizer regarding potential warpage problems or handling problems during the galvanizing process that may require adjustment of fabrication techniques or design before finalizing shop drawings and beginning of fabrication.
- C. Cleaning: Thoroughly clean metal surfaces of all mill scale, rust, dirt, grease, oil, moisture and other contaminants prior to galvanizing.
- D. Application: Hot-dip galvanizing shall be applied in accordance with:
 1. ASTM A 143: Safeguarding Against Embitterment of Hot-Dip Galvanized Structural Steel.
 2. ASTM A 123: Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 3. ASTM A 153: Galvanized Coating on Iron and Steel Hardware - Table 1.
 4. ASTM A 385: Practice for Providing High Quality Zinc Coatings.
 5. ASTM A 924: Galvanized Coating on Steel Sheets.
 6. Minimum weight of galvanized coating shall be two (2) oz. per square foot of surface.
- E. Fabricate joints which will be exposed to weather in a manner to exclude water or provide weep holes where water may accumulate.
- F. All galvanized materials must be inspected for compliance with these specifications and marked with a stamp indicating the name of the galvanizer, the weight of the coating, and the appropriate ASTM number.

- G. To minimize surface imperfection (eg: flux inclusions), material to be galvanized shall be dipped into a solution of Zinc Ammonium Chloride (pre-flux) immediately prior to galvanizing. The type of galvanizing process utilizing a flux blanket overlaying the molten zinc will not be permitted.
- H. After galvanizing all materials not exposed to view must be chromated by dipping material in a 0.2% chromic acid solution.
- I. Galvanized surfaces, where exposed to view, must have a smooth, level surface finish. Where this does not occur, piece shall be rejected and replaced to the acceptance of the Commissioner.

2.4 PROTECTIVE COATINGS

- A. Whenever dissimilar metals will be in contact, separate contact surfaces by coating each contact surface prior to assembly or installation with one coat of specified bituminous paint, which shall be in addition to the specified shop prime paint. Mask off those surfaces not required to receive protective coating.

2.5 WORKMANSHIP

A. General

- 1. Miscellaneous metal work shall be fabricated by an experienced fabricator or manufacturer and installed by an experienced tradesman.
 - 2. Materials, methods of fabrication, fitting, assembly, bracing, supporting, fastening, operating devices, and erection shall be in accordance with drawings and specifications, approved shop drawings, and best practices of the industry, using new and clean materials as specified, having structural properties sufficient to safely sustain or withstand stresses and strains to which materials and assembled work will be subjected.
 - 3. All work shall be accurately and neatly fabricated, assembled and erected.
- B. Shop Assembly: Insofar as practicable, fitting and assembly of work shall be done in shop. Shop assemble work in largest practical sizes to minimize field work. It is the responsibility of the miscellaneous metal subcontractor to assure himself that the shop-fabricated miscellaneous metal items will properly fit the field condition. In the event that shop-fabricated miscellaneous metal items do not fit the field condition, the item shall be returned to the shop for correction.
 - C. Cutting: Cut metal by sawing, shearing, or blanking. Flame cutting will be permitted only if cut edges are ground back to clean, smooth edges. Make cuts accurate, clean, sharp and free of burrs, without deforming adjacent surfaces or metals.
 - D. Holes: Drill or cleanly punch holes; do not burn.
 - E. Connections: Make connections with tight joints, capable of developing full strength of member, flush unless indicated otherwise, formed to exclude water where exposed to

weather. Locate joints where least conspicuous. Unless indicated otherwise, weld or bolt shop connections; bolt or screw field connections. Provide expansion and contraction joints to allow for thermal movement of metal at locations and by methods approved by Commissioner.

1. Welding

- a. Shall be in accordance with "Standard Code for Welding in Building Construction" of the American Welding Society, and shall be done with electrodes and/or methods recommended by the manufacturer of the metals being welded.
- b. Welds shall be continuous, except where spot welding is specifically permitted. Welds exposed to view shall be ground flush and dressed smooth with and to match finish of adjoining surfaces; undercut metal edges where welds are required to be flush.
- c. All welds on or behind surfaces which will be exposed to view shall be done so as to prevent distortion of finished surface. Remove weld spatter and welding oxides from all welded surfaces.

2. Bolts and Screws: Make threaded connections tight with threads entirely concealed. Use lock nuts. Bolts and screw heads exposed to view shall be flat and countersunk. Cut off projecting ends of exposed bolts and screws flush with nuts or adjacent metal.

F. Operating Mechanism: Operating devices (i.e. pivots, hinges, etc.) mechanism and hardware used in connection with this work shall be fabricated, assembled, installed and adjusted after installation so that they will operate smoothly, freely, noiselessly and without excessive friction.

G. Built-In Work: Furnish anchor bolts, inserts, plates and any other anchorage devices, and all other items specified under this Section of the Specifications to be built into concrete, masonry or work of other trades, with necessary templates and instructions, and in ample time to facilitate proper placing and installation.

H. Supplementary Parts: Provide as necessary to complete each item of work, even though such supplementary parts are not shown or specified.

I. Coordination: Accurately cut, fit, drill and tap work of this Section to accommodate and fit work of other trades. Furnish or obtain, as applicable, templates and drawings to or from applicable trades for proper coordination of this work.

J. Exposed Work

1. In addition to requirements specified herein and shown on drawings, all surfaces exposed to view shall be clean and free from dirt, stains, grease, scratches, distortions, waves, dents, buckles, tool marks, burrs, and other defects which mar appearance of finished work.

2. Metal work exposed to view shall be straight and true to line or curve, smooth arrises and angles as sharp as practicable, miters formed in true alignment, profiles accurately intersecting, and with joints carefully matched to produce continuity of line and design.
 3. Exposed fastenings, where permitted, shall be of the same material, color and finish as the metal to which applied, unless otherwise indicated, and shall be of the smallest practicable size.
- K. Preparation for Hot-Dip Galvanizing: Fabricator shall correctly prepare assemblies for galvanizing in consultation with galvanizer and in accordance with applicable Reference Standards and applicable AGA publications for the "Design of Products to be Hot-Dip galvanized After Fabrication." Preparation shall include but not be limited to the following:
1. Remove welding flux.
 2. Drill appropriate vent holes and provide for drainage in inconspicuous locations of hollow sections and semi-enclosed elements. After galvanizing, plug vent holes with shaped lead and grind smooth.

2.6 MISCELLANEOUS METALS ITEMS

A. Rough Hardware

1. Furnish bent or otherwise custom fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous steel and iron shapes as required for framing and supporting woodwork, and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware items are specified in Division 6 Sections.
2. Fabricate items to sizes, shapes and dimensions required. Furnish malleable iron washers for heads and nuts which bear on wood connections; elsewhere, furnish steel washers.

B. Ladders

1. Vertical steel ladders shall be eighteen (18) inches wide with 3/4" diameter non-slip steel rungs spaced twelve (12) inches o.c. Stringers shall be 3/8" thick by 2-1/2" wide steel bars; rungs welded to bars. Attach ladders to walls six (6) inches from top and bottom and maximum thirty-six (36) inches o.c. from these points. At the roof, gooseneck the rails back to the structure to provide secure ladder access.
2. Ladders shall be fabricated to support a live load of one hundred (100) lbs. per square foot and a concentrated load of three hundred (300) lbs. per rung; loads not to act simultaneously.

C. Steel Pipe Handrails

1. Steel pipe of size shown on Drawings, Schedule 40. Fittings shall be flush type, malleable of cast iron. Brackets shall be malleable iron, design as selected by the Commissioner.
2. Construction: Form direction changes in rails using solid bar stock or elbows. Connections shall be shop welded and ground smooth and flush, except where field connections and expansion joints are required. Field connections may be welded, internal sleeve and plug weld, or internal sleeve and set screw.
3. Secure handrails to walls with wall brackets. Provide brackets of malleable iron castings, with not more than three (3) inches clearance from inside face of handrail to wall surface. Neatly drill wall plate portion of the bracket into concrete or masonry to receive bolts for concealed anchorage. For installation at drywall, Drywall trades shall provide plate to receive wall plate portion of bracket and anchor or bolt wall plate through drywall to supporting steel plate. Locate brackets at not more than 5'-0" o.c. unless otherwise shown.
4. Provide wall return fittings of cast iron, flush type, with the same projection as that specified for wall brackets.
5. Provide fasteners required based on surfaces encountered and complying with Load requirements.
6. Longitudinal members shall be parallel with each other and with floor surface or shape of stair to a tolerance of 1/8" in 10'-0" linear feet. Center line of members within each run of railing shall be in the plane.
7. For steel pipe posts where indicated, anchor posts in concrete by means of pipe sleeves set and anchored into concrete. Provide sleeves of galvanized steel pipe, not less than six (6) inches long and having an inside diameter not less than 1/2" greater than outside diameter of the inserted pipe. Provide steel plate closure secure to bottom of sleeve and of width and length not less than one (1) inch greater than outside diameter of sleeve. After posts have been inserted into sleeves, fill annular space between post and sleeve solid with non-shrink, non-ferrous grout. Cover anchorage joint with a round steel flange welded to post. Posts shall be set plumb within 1/8" vertical tolerance.
8. Steel pipe handrails shall be capable of resisting a two hundred (200) lb. force applied to rail from any direction and a uniformly distributed load of fifty (50) lbs. per linear foot applied downward or horizontally, loads not to act simultaneously.
9. Provide anchors for attachment to masonry.

D. Ornamental Handrails and Railings

1. Welded Connections: Fabricate handrails and railings for connecting members by welding. Cope components at perpendicular and screw connections to provide close fit, or use fittings designed for this purpose. Weld connections continuously to comply with the following:

- a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
- b. Obtain fusion without undercut or overlap.
- c. Remove flux immediately.
- d. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- e. Form changes in direction of railing members by radius bends.
- f. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain profile of member throughout entire bend without buckling, twisting, or otherwise deforming exposed surfaces of handrail and railing components.
- g. Provide wall returns at ends of wall-mounted handrails, close ends of returns.
- h. Close exposed ends of handrail and railing members with prefabricated end fittings.
- i. Brackets, Flanges, Fittings, and Anchors: Provide brackets, flanges, miscellaneous fittings, and anchors to interconnect handrail and railing members to other work, unless otherwise indicated.
 - 1). Furnish inserts and other anchorage devices for connecting handrails and railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by handrails and railings. Coordinate anchorage devices with supporting structure.
 - 2). For railing posts set in concrete, provide preset sleeves of steel, not less than 6 inches long and inside dimensions not less than 1/2 inch greater than outside dimensions of post, with steel plate forming bottom closure.

E. Loose Steel Lintels

1. Provide loose structural steel lintels for openings and recesses in masonry walls and partitions as shown. Weld adjoining members together to form a single unit where indicated. Provide not less than eight (8) inches bearing at each side of openings, unless otherwise indicated.
2. Loose lintels shall conform to the following Schedule:

Opening Width (Maximum)	WALL THICKNESS		
	4 inches	6 inches	8 inches*
2'-0"	3-1/2" x 3-1/2" x 1/4"	6" x 4" x 5/16"	3-1/2" x 3-1/2" x 1/4"
3'-0"	3-1/2" x 3-1/2" x 5/16"	6" x 4" x 5/16"	3-1/2" x 3-1/2" x 5/16"

4'-0"	3-1/2" x 3-1/2" x 5/16"	6" x 4" x 5/16"	3-1/2" x 3-1/2" x 5/16"
5'-0"	4" x 3-1/2" x 3/8"	6" x 4" x 3/8"	4" x 3-1/2" x 5/16"
6'-0"	5" x 3-1/2" x 3/8"	6" x 4" x 3/8"	5" x 3-1/2" x 5/16"
7'-0"	5" x 3-1/2" x 3/8"	5" x 5" x 1/2"	5" x 3-1/2" x 3/8"
8'-0"	5" x 3-1/2" x 3/8"	5" x 5" x 5/8"	5" x 3-1/2" x 3/8"

* Two angles at all openings in eight (8) inch walls.

3. At columns or vertical surfaces where lintels cannot bear on masonry, provide clip angles sized for structural capacity of lintel.

F. Miscellaneous Light Steel Framing

1. Light steel framing, bracing, supports, framing, clip angles, shelf angles, plates, etc., shall be of such shapes and sizes as indicated on the drawings and details or as required to suit the condition and shall be provided with all necessary supports and reinforcing such as hangers, braces, struts, clip angles, anchors, bolts, nuts, welds, etc., as required to properly support and rigidly fasten and anchor same in place and to steel, concrete, masonry and all other connecting and adjoining work.
2. All light steel framing steel shall be furnished and erected in accordance with the applicable requirements of the "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings" by the American Institute of Steel Construction and as specified herein.

- G. Air Handling Unit Sleeve: Provide galvanized steel sleeve to hold the air conditioner in the wall, as designed to support the weight of the air handler. Sleeve shall be sized as required for specified air conditioner; purchase air handler from the same company that manufactures the sleeve.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where miscellaneous metal is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 ERECTION

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction;

including threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

- B. Cutting, Fitting and Placement: Perform cutting, drilling and fitting required for installation of miscellaneous metal fabrications. Set work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items which are to be built into concrete, masonry, or similar construction.
- C. Fitting Connections: Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind exposed joints smooth and touch up shop paint coat. Do not weld, cut or abrade the surfaces of exterior units which have been hot dip galvanized after fabrication, and are intended for bolted or screwed field connections.
- D. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance, and quality of welds made, and methods used in correcting welding work.
- E. Touch-Up Painting: 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. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- F. Field Touch-Up of Galvanized Surfaces: Touch-up shop applied galvanized coatings damaged during handling and installation. Use galvanizing repair coating specified herein for galvanized surfaces.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 055100

STEEL PAN STAIRS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 PERFORMANCE REQUIREMENTS

1.3 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the steel pan stairs as indicated on the drawings and specified herein, including but not limited to, the following:
 - 1. Steel pan stairs, including all clips, hangers, inserts, braces and other supports.
 - 2. Steel pipe handrails, guardrails and intermediate rails for steel stairs, including supports, brackets, and anchors.
 - 3. Visual, tactile slip resistant strip for stair nosings for new and existing stairs.
 - 4. Epoxy patching at existing stairs.

1.4 RELATED SECTIONS

- A. Structural steel - Section 051200.
- B. Miscellaneous metals - Section 055000.
- C. Unit Masonry - Section 042000
- D. Masonry Restoration and Cleaning - Section 049000

- E. Rough Carpentry – Section 061000
- F. Finish Carpentry- Section 062000
- G. Installation of inserts in drywall furnished by this Section - Section 092500.
- H. Painting and Finishing - Section 099000.

1.5 QUALITY ASSURANCE

- A. Qualification of Welders: Use only certified welders and the shielded arc process for all welding performed in connection with the work of this Section. Protect adjacent surfaces when field welding to prevent damage or stain. Welders and welding operators must be qualified by tests as provided by AWS.
- B. Codes and Standards: In addition to complying with all pertinent codes and regulations, comply with:
 - 1. "Specifications for Design, Fabrication and Erection of Structural Steel for Buildings" of the American Institute of Steel Construction.
 - 2. "Code for Welding in Building Construction" of the American Welding Society.
 - 3. "Metal Stairs Manual" of the National Association of Architectural Metal Manufacturers.
- C. Field Measurements: If construction process permits, take field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress. Allow for trimming and fitting wherever taking field measurements before fabrication might delay work.
- D. Tolerances: Allow for construction tolerances as required.
- E. Coordination: Coordinate this work with the work of all other trades interfacing with metal pan stairs, such as structural openings, sprinklers and standpipes, and other trades as required.

1.6 DRAWING SUBMISSION

- A. General: It is the intent of the Working Drawings to display the layouts and general design parameters upon which the Shop Drawings shall be developed. Detail development and all connections shall be part of Shop Drawing Development.
- B. LEED BUILDING Submittal Requirements:
The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 - 1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Sustainable Design Requirements (LEED Building) - Section 018113 of these specifications. Information to be supplied includes:

- a. The amount of recycled content in the product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s) and the location (source) of the raw materials used to manufacture the product(s)
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
 3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
 4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
- B. Shop Drawings
1. Before any steel stairs are fabricated, submit shop drawings to the Commissioner for approval.
 2. Show all locations, markings, quantities, materials, sizes and shapes, and indicate all methods of connecting, anchoring, fastening, bracing, for the stair construction, support and attachment to the work of other trades.
- C. Engineering Data
1. Before any metal pan stairs are fabricated, submit engineering data drawings to the Commissioner for review. The Contractor is responsible for the structural design and supports for the stair system and must show his proposed system on these drawings.
 2. These drawings must show all load conditions and design calculations relative to connections, fastening devices and anchorage, as well as size and gauge of stair members. Calculations and drawings must be prepared by a Structural Engineer licensed in the State of New York and shall be signed and sealed by this Engineer.

1.7 SAMPLES SUBMISSION

- A. Submit the following listed samples and other samples as may be requested by the Commissioner, to show the quality standards:
1. Railing bracket.
 2. Exposed weld.
 3. Exposed bolted connection.
 4. Bent pipe railing.
- B. Samples shall be submitted cleaned and shop primed and shall represent standards to which all respective materials used in the Project shall meet.

1.8 PERFORMANCE STANDARDS

- A. LEED BUILDING Performance Criteria: The following criteria are REQUIRED for the products included in this section:
1. Metal members (*and/or steel deck, steel tubing, framing, metal stairs, etc.*) shall contain a minimum of 35% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Structural steel shall contain 75%. Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.
 2. Metal members (*and steel deck, steel tubing, framing, metal stairs, etc.*) fabricated within, and containing raw materials extracted within, 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements above.
 3. Adhesives or sealants used for work in this section shall meet the requirements of Section 018113.3: Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
 4. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.
- B. Stairs and railings shall be constructed to conform to the following performance standards, unless greater required by Code:
1. Stairs and platforms shall support a live load of one hundred (100) psf and a concentrated live load of three hundred (300) lbs. and shall have a live load deflection limited to 1/360 of the span. Loads shall not apply simultaneously.
 2. Railings shall withstand a two hundred (200) lb. force applied to rail from any direction, and a uniformly distributed load of 50 lbs./lin. ft. applied downward or horizontally, loads not to act simultaneously.

1.9 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect steel pan stair before, during and after installation and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Commissioner and at no additional cost to The City of New York.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Structural Steel: ASTM A 36.
- B. Steel Sheets: ASTM A 245, Grade C, minimum ten (10) gauge for platforms, twelve (12) gauge minimum for treads and risers.
- C. Steel Pipe: ASTM A 53, Type E., Grade A, and ASTM A 501. Use standard malleable iron fittings for steel pipe.
- D. Malleable Iron Castings: ASTM A 47, Grade 35018.
- E. Bolts and Nuts: ASTM A 307, Grade A bolts.
- F. Machine Screws: Fed Spec. FF-S-92.
- G. Expansion Bolts: "Cinch" type, galvanized, of approved manufacture.
- H. Threaded End Hanger Rods: Minimum 3/4" diameter, ASTM A 36.
- I. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.
- J. Bituminous Paint: Fed. Spec. TT-C-494.
- K. Concrete Fill and Reinforcing Materials
 - 1. Concrete Materials and Properties: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, ready-mixed concrete with a minimum 28-day compressive strength of 3000 psi.
 - 2. Nonslip-Aggregate Finish: Factory-packaged abrasive aggregate made from fused, aluminum-oxide grits or crushed emery; rustproof and nonglazing; unaffected by freezing, moisture, or cleaning materials.
 - 3. Welded Wire Fabric: ASTM A 185, 6 by 6 inches – W1.4 by W1.4, unless otherwise indicated.

- L. Slip resistant strips and nosing as selected by Commissioner.

2.2 FABRICATION

A. General

1. Steel pan stair work shall be fabricated by an experienced manufacturer in accordance with approved shop drawings and best practices of the industry, using new and clean materials as specified, having structural properties sufficient to safely sustain or withstand strains and stresses to which material will be subjected.
2. Fabricate shop assemblies in largest practical sizes to minimize field work. All exposed surfaces shall be clean and free from all dirt, stains, grease marks, scratches, waves, dents, buckles, tool marks, rattles, and other objectionable defects which mar appearance or use of finished work.
3. Cutting: Cut materials by sawing, shearing, or blanking. Flame cutting will be permitted when ground back to clean edges. Cuts shall be made accurately, clean, sharp and free of burrs, without deforming adjacent metals.
4. Connections: Make connections with tight joints, capable of developing full strength of the members, flush. Locate joints where least conspicuous. Use concealed fasteners where possible. Weld or rivet shop connections; bolt, screw or weld field connections.
 - a. Welding: Welds shall be continuous, except where spot welding is specifically permitted. Welding shall conform to the Standard Code of the American Welding Society. Exposed welds are required to be ground flush.
 - b. Bolts and Screws: Make threaded connections tight with threads entirely concealed. Use lock nuts, or upset thread ends. Exposed bolts and screw head shall be flat and countersunk, unless otherwise indicated on drawings. Remove projecting ends of bolts and screws. Punch or drill holes; do not burn.

B. Stairs and Platforms

1. Provide stringers, risers, sub-treads and platforms matching profiles as shown. Form tread pan and riser in a continuous piece to receive the finished tread; tread shall be a minimum of twelve (12) gauge. Weld risers and treads to carrier angles which shall be welded to the structural steel stringers. Fasten countersunk bolts or stud welded clips through mesh for cement fill. Provide welded-on clips for the support of gypsum drywall soffits.
2. On intermediate platforms, provide metal bases formed of stringers. Miter and weld and grind smooth internal and external corners of metal bases. Form platform runs of minimum ten (10) gauge steel.
3. Countersink bolt heads and screws on finished surfaces or cut off flush with such surfaces.

4. Properly fit and securely fasten together all parts making exposed joints close fitting. Cut, drill, punch and tap as required for installation.
5. Make joints as strong and rigid as adjoining sections. Weld continuously along entire line of contact except where spot welding is indicated.
6. Give ferrous metal surfaces a shop coat of primer. Before painting, thoroughly clean surfaces with wire brushes or other proper and effective means of removing loose scale, filings or other objectionable materials.
7. Remove grease prior to painting. Separate dissimilar metals in or adjacent to work of this Section with a coat of bituminous paint on each surface prior to installation.
8. Closure and Filler Plates: Where indicated on drawings or as required, at least twelve (12) gauge sheet steel, securely fastened to top and bottom of stringer and adjacent wall, by welding or screws.
9. Struts, Hangers, Platform Headers and Subframing
 - a. Provide supports as detailed and required, including all struts, clip angles, angles or hangers which are required and necessary for support of stair construction.
 - b. Supports shall be of size suitable for the support load, as required. Struts, angles and hangers shall be supported by and directly connected to the structural framing. Struts and hangers, with their connections, shall be concealed.
 - c. Provide other inserts, anchors and/or other subframing as may be required to complete the stair construction and properly support it on the structural framing.

C. Handrails, Railings, Posts and Brackets

1. Provide steel pipe of size shown on drawings, Schedule 40. Use heavier weight pipes and/or reinforce pipes internally as required to meet performance standards given in paragraph 1.7 herein. Fittings shall be flush type, malleable or cast iron. Wall brackets shall be steel design as detailed.
2. Handrail, post and railing spacing shall meet Code requirements.
3. Construction: Form direction changes in rails using solid bar stock or elbows. Connections shall be shop welded, except where expansion joints are required. Field connections shall be welded for continuity. All exposed welds shall be ground smooth and flush.
 - a. If elbows are not available for angles shown, bends shall maintain full diameter of pipe, use mandrel, no kinks, ripples, flats are acceptable.
4. Fabricate steel tubing with wall thickness of 0.120".

12/21/2012

5. Anchor posts to steel with steel flanges, angle type or floor type as required by conditions, welded to posts and bolted to the steel supporting members.
 6. Secure handrails to walls with wall brackets. Provide brackets as shown on drawings. For installation in drywall, furnish Drywall Section steel plate to receive wall plate portion of bracket and anchor or bolt wall plate through drywall to supporting steel plate. Locate brackets at not more than 5'-0" o.c. unless otherwise shown.
 7. Anchor rail ends into adjacent walls with steel flanges welded to rail ends and anchored into the wall construction as described above.
 8. Shop prime as specified above for stairs and platforms.
- D. Slip Resistant Strip for Stair Nosings: Provide "Flex-Tred Anti-Slip Tape" as manufactured by Wooster Products, Inc., "Vinyl Stair Nosing" by Johnsonite, "Stair Nosing" by Burke Industries or equal, color as selected by the Commissioner.
1. Install on dry, clean, smooth surface. Remove the protective liner from the underside to expose pressure-sensitive adhesive, then apply in the proper position and roll or press in place.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where steel pan stairs are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Work in the field shall comply with the same requirements as specified for shop work above.
- B. Except where otherwise shown or specified for a particular item of work or for built-in work, fasten metal work to solid masonry with expansion bolts. Fastenings to wood plugs in masonry will not be accepted. Drill holes to the exact diameter of the bolts using a rotary drill for concrete and a percussion drill for other masonry. Thread screws full length to the head of the screw.
- C. Provide connecting members needed for properly securing the work to masonry, drywall and structural framing, including bolts, machine screws, rods, hangers, inserts, sleeves, plates, anchors, expansion bolts, washers and other items as required. Furnish built-in items to drywall trades as required for proper anchorage.
- D. Leave work exposed to view, including stair soffits, clean, smooth and neatly finished. All exposed welds shall be dressed smooth.

- E. Include supplementary parts necessary to complete each item even though such work is not definitively shown or specified.
 - F. Coordinate and schedule the work of this Section with the work of other trades. Furnish anchors, sockets, fastenings and other miscellaneous items to be embedded in concrete or masonry, or required for securing metal work to other construction so as not to delay job progress.
 - G. Attach wall railings to the wall construction, using appropriate bolts and anchors to meet performance standards.
 - H. Install work plumb and true to the exact lines and levels, in the correct location and in proper relation to adjoining work.
 - I. Touch up marred and abraded shop paint of exposed surfaces after erection in the field.
 - J. Posts shall be set plumb within 1/8" vertical tolerance. Longitudinal members shall be parallel with each other and with floor surface or slope of stair to a tolerance of 1/8" in ten (10) linear feet. Center lines of members within each run of railing shall lie in the same vertical plane. Field joints of connecting sections shall be hairline.
- 3.3 TOUCH-UP PAINTING
- A. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop coat, and paint exposed areas with same material used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 061000

ROUGH CARPENTRY

GENERAL

1.1 SUMMARY

A. General Requirements

1. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
2. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

B. This Section includes the following:

1. Rooftop equipment bases and support curbs.
2. Blocking and miscellaneous wood, including nailers and wall lining for telephone and electric closets
3. Plywood backing panels
4. Paint grade sub-floor
5. Rough hardware
6. Installation only of finish hardware.
7. Installation only of doors and hollow metal frames.

C. RELATED WORK

1. Construction Waste Management and Disposal - Section 017419
2. Sustainable Design Requirements (LEED Building) - Section 018113

3. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings
- Section 018113.3
4. Construction IAQ Requirements - Section 018119
5. Cold Formed Metal Framing – Section 054000
6. Gypsum Drywall- Section 092500
7. General Conditions and Addendum to the General Conditions
8. Divisions 21-23 and 26-28.

D. SUBMITTALS

1. Product Data: For each type of process and factory-fabricated product.
 - a. Include data for wood-preservative and fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

2. LEED BUILDING Submittal Requirements:

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications. Information to be supplied includes:

- a. The amount of recycled content in the wood product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. Location in which wood materials were manufactured or fabricated and location from which wood was harvested.
 - c. For wood products, indication (Y/N) of whether the supplied product(s) are certified by the Forest Stewardship Council (FSC).
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment. Include total cost for all wood products and itemized costs for all FSC-certified wood products.
3. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
 4. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be

submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.

5. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
 6. Documentation that all composite wood and agrifiber products do not contain added urea-formaldehyde resins.
- E. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the American Lumber Standards Committee Board of Review.
- F. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
1. Wood-preservative-treated wood.
 2. Fire-retardant-treated wood.
 3. Power-driven fasteners.
 4. Powder-actuated fasteners.
 5. Expansion anchors.
 6. Metal framing anchors.

1.2 QUALITY ASSURANCE

A. LEED BUILDING Performance Criteria:

The following criteria are REQUIRED for the products included in this section:

1. Engineered wood, not including salvaged wood, shall contain a minimum of 10% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.
2. All composite wood, engineered wood, or agrifiber products (e.g., plywood, particleboard, medium density fiberboard) shall contain no added urea-formaldehyde resins. Acceptable resins and binders include, but are not limited to, phenol formaldehyde and methyl diisocyanate (MDI). Certification of these products shall be in accordance with the Submittal Requirements of this Section.
3. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.

4. Wood Materials harvested and manufactured within 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements of this Section.
5. Permanently Installed wood-based materials used in this project that have been certified in accordance with the Forest Stewardship Council (FSC) guidelines shall be documented in accordance with the Submittal Requirements of this Section.
 - a. Applicable products include, but are not limited to, structural framing and general dimensional framing, flooring, finishes, built-in furnishings, miscellaneous blocking, fire rated plywood back panels used for equipment mounting, architectural panels, and plywood.
 - b. Certified wood material suppliers may be researched through the following websites: www.rainforest-alliance.org/greenbuilding, www.smartwood.org, <http://www.certifiedwoodsearch.org/searchproducts.aspx>, http://www.fscus.org/certified_companies/.
 - c. Wood products previously purchased and used on prior projects, which are reused on this Project, are exempt from the FSC certification requirement. Appropriate documentation certifying reused wood products must be submitted.
6. Adhesives or sealants used for work in this section shall meet the requirements of Section 018113.3 : Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
7. Clear wood finishes, floor coatings, stains, sealers, and shellacs applied to the interior shall meet the VOC limitations defined in Rule 1113, "Architectural Coatings" of SCAQMD, of the State of California. The VOC limits defined by SCAQMD, based on 7/9/04 amendments, are as follows. VOC limits are defined in grams per liter, less water and less exempt compounds.
 - a. Clear Wood Finishes
 - i. Varnish 350
 - ii. Sanding Sealers 350
 - iii. Lacquer 550
 - b. Shellac
 - i. Clear 730
 - ii. Pigmented 550
 - c. Stains 250
 - d. Floor Coatings 100
 - e. Waterproofing Sealers 250
 - f. Sanding Sealers 275
 - g. Other Sealers 200
7. The calculation of VOC shall exclude water and tinting color added at the point of sale
8. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.

PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 7. Factory mark each piece of lumber with grade stamp of grading agency.
 - 8. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
 - 9. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
 - 1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A Preservative Treatment by Pressure Process: AWPAC2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPAC31 with inorganic boron (SBX).
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
- C Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat all rough carpentry, unless otherwise indicated.
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.
 - 3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.

4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A General: Comply with performance requirements in AWPA C20 (lumber) and AWPA C27 (plywood).
1. Use Exterior type for exterior locations and where indicated.
 2. Use Interior Type A, High Temperature (HT) for enclosed roof framing, framing in attic spaces, and where indicated.
 3. Use Interior Type A, unless otherwise indicated.
- B Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
- C Application: Treat all rough carpentry, unless otherwise indicated.
1. Framing for raised platforms.
 2. Concealed blocking.
 3. Roof construction.
 4. Plywood backing panels.

2.4 DIMENSION LUMBER FRAMING

- A Maximum Moisture Content: 19 percent.
- B Framing Other Than Non-Load-Bearing Interior Partitions: Any species and grade with a modulus of elasticity of at least 1,500,000 psi and an extreme fiber stress in bending of at least 1500 psi for 2-inch nominal thickness and 12-inch nominal width for single-member use.

2.5 PLYWOOD SUB-FLOOR FOR FINISHED PAINTING

- A Plywood B-D, face grade B fire retardant plywood in thickness as shown on the documents to be used as underlayment with finished face suitable for painting and free of knots and blemishes and with plugged crossbands underface.

2.6 6-PLYWOOD BACKING PANELS

- A Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch nominal thickness.

2.7 FASTENERS

- A General: Provide fasteners of size and type indicated that comply with requirements specified.
 - 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 A 153.
- B Power-Driven Fasteners: NES NER-272.
- C Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.

EXECUTION

3.1 INSTALLATION

- A. Set rough carpentry, including subfloors, to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. NOT USED
- E. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.
- F. Do not splice structural members between supports, unless otherwise indicated.
- G. Comply with AWPAM4 for applying field treatment to cut surfaces of preservative-treated lumber.
- H. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 2. NES NER-272 for power-driven fasteners.
 - 3. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - 4. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in ICBO's Uniform Building Code.
 - 5. Table 2305.2, "Fastening Schedule," in BOCA's BOCA National Building Code.
 - 6. Table 2306.1, "Fastening Schedule," in SBCCI's Standard Building Code.

7. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
8. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in ICC's International One- and Two-Family Dwelling Code.

3.2 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

SECTION 061600

SHEATHING

PART 1 - GENERAL

1.1 SUMMARY OF WORK

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

B LEED BUILDING - GENERAL REQUIREMENTS:

The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 RELATED DOCUMENTS

- A.
1. Construction Waste Management And Disposal - Section 017419
 2. Sustainable Design Requirements (Leed Building) - Section 018113
 3. Volatile Organic Compound (Voc) Limits For Adhesives, Sealants, Paints And Coatings - Section 018113.3
 4. Construction IAQ Requirements – Section 018119
 5. Cold Formed Metal Framing – Section 054000
 6. Building Insulation- Section 072100
 7. Gypsum Drywall- Section 092500
 8. Thermoplastic Membrane Roofing- Section 075400
 9. Sheet Metal Flashing- Section 076200
 10. Counterweighted Roped Hydraulic Elevator- Section 142120

1.3 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Roof sheathing.
3. Composite nail base insulated roof sheathing.
4. Underlayment.
5. Sheathing joint and penetration treatment.

B. Related Requirements:

1. Construction Waste Management and Disposal - Section 017419
2. Sustainable Design Requirements (LEED Building) - Section 018113
3. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3
4. Construction IAQ Requirements - Section 018119
5. Rough Carpentry – Section 061000
6. Thermoplastic Membrane Roofing –Section 075400
7. Hollow Metal Doors and Frames – Section 081113

1.4 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 plywood complies 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 plywood complies with requirements. Include physical properties of treated materials.
3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5516.
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.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. LEED BUILDING Submittal Requirements:

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the wood product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. Location in which wood materials were manufactured or fabricated and location from which wood was harvested.
 - c. For wood products, indication (Y/N) of whether the supplied product(s) are certified

by the Forest Stewardship Council (FSC).

- c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment. Include total cost for all wood products and itemized costs for all FSC-certified wood products.
2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
5. Documentation that all composite wood and agrifiber products do not contain added urea-formaldehyde resins.

1.5 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For following products, from ICC-ES:

1. Preservative-treated plywood.
2. Fire-retardant-treated plywood.
3. Gypsum Sheathing
4. Gypsum Roof Board.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

B. LEED BUILDING Performance Criteria:

The following criteria are REQUIRED for the products included in this section:

1. Engineered wood, not including salvaged wood, shall contain a minimum of 10% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content

is based on the weight of the component materials). Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.

2. All composite wood, engineered wood, or agrifiber products (e.g., plywood, particleboard, medium density fiberboard) shall contain no added urea-formaldehyde resins. Acceptable resins and binders include, but are not limited to, phenol formaldehyde and methyl diisocyanate (MDI). Certification of these products shall be in accordance with the Submittal Requirements of this Section.
3. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.
4. Wood Materials harvested and manufactured within 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements of this Section.
5. Permanently Installed wood-based materials used in this project that have been certified in accordance with the Forest Stewardship Council (FSC) guidelines shall be documented in accordance with the Submittal Requirements of this Section.
 - a. Applicable products include, but are not limited to, structural framing and general dimensional framing, flooring, finishes, built-in furnishings, miscellaneous blocking, fire rated plywood back panels used for equipment mounting, architectural panels, and plywood.
 - b. Certified wood material suppliers may be researched through the following websites: www.rainforest-alliance.org/greenbuilding, www.smartwood.org, <http://www.certifiedwoodsearch.org/searchproducts.aspx>, http://www.fscus.org/certified_companies/.
 - c. Wood products previously purchased and used on prior projects, which are reused on this Project, are exempt from the FSC certification requirement. Appropriate documentation certifying reused wood products must be submitted.
6. Adhesives or sealants used for work in this section shall meet the requirements of Section 018113.3 : Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
7. Clear wood finishes, floor coatings, stains, sealers, and shellacs applied to the interior shall meet the VOC limitations defined in Rule 1113, "Architectural Coatings" of SCAQMD, of the State of California. The VOC limits defined by SCAQMD, based on 7/9/04 amendments, are as follows. VOC limits are defined in grams per liter, less water and less exempt compounds.
 - a. Clear Wood Finishes
 - i. Varnish 350
 - ii. Sanding Sealers 350
 - iii. Lacquer 550
 - b. Shellac
 - i. Clear 730
 - ii. Pigmented 550
 - c. Stains 250
 - d. Floor Coatings 100
 - e. Waterproofing Sealers 250

- f. Sanding Sealers 275
- g. Other Sealers 200

- 7. The calculation of VOC shall exclude water and tinting color added at the point of sale
- 8. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.

1.7 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-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory."

2.2 WOOD PANEL PRODUCTS

- A. Emissions: Products shall meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Plywood: Either DOC PS 1 or DOC PS 2 unless otherwise indicated.
- C. Oriented Strand Board: DOC PS 2.
- D. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- E. Factory mark panels to indicate compliance with applicable standard.

2.3 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat all plywood unless otherwise indicated.

2.4 FIRE-RETARDANT-TREATED PLYWOOD

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction 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 Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, 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. Use treatment that does not promote corrosion of metal fasteners.
 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 4. Design Value Adjustment Factors: Treated lumber plywood shall be tested according to ASTM D 5516 and design value adjustment factors shall be calculated according to ASTM D 6305. Span ratings after treatment shall be not less than span ratings specified. For roof sheathing and where high-temperature fire-retardant treatment is indicated, span ratings for temperatures up to 170 deg F shall be not less than span ratings specified.
- C. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.
- E. Application: Treat all plywood unless otherwise indicated.

2.5 WALL SHEATHING

- A. Cellulose Fiber-Reinforced Gypsum Sheathing: ASTM C 1278/C 1278M, gypsum sheathing.
 1. Product: Subject to compliance with requirements, provide "Fiberock Sheathing with Aqua-Tough" by United States Gypsum Co, DensGlass Sheathing by Georgia Pacific, "Weather Defense Platinum Type X" by LaFarge North America or approved equal.

2. Type and Thickness: Type X, 5/8 inch thick.
3. Size: 48 by 96 inches 48 by 108 inches 48 by 120 inches.

2.6 ROOF SHEATHING

- A. Gypsum Roof Sheathing: DensDeck Roof Board by Georgia Pacific, "Securock Glass-Mat Roof Board" by United States Gypsum Co, "Weather Defense Platinum Type X" by LaFarge North America, or approved equal.
1. Nominal Thickness: Not less than 5/8 inch.

2.7 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
1. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
1. For wall and roof sheathing panels, provide screws with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
- F. 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, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
1. For steel framing less than 0.0329 inch thick, use screws that comply with ASTM C 1002.
- G. Screws for Fastening Oriented-Strand-Board-Surfaced, Polyisocyanurate-Foam Sheathing to Metal Roof Deck: Steel drill screws, in type and length recommended by sheathing manufacturer for thickness of sheathing to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117. Provide washers or plates if recommended by sheathing manufacturer.

2.8 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C 834, 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.

2.9 MISCELLANEOUS MATERIALS

- A. Adhesives for Field Gluing Panels to Framing: Formulation complying with ASTM D 3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.
1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

PART 3 - EXECUTION

3.1 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 indicated, complying with the following:
1. NES NER-272 for power-driven fasteners.
 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
 3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's "International Residential Code for One- and Two-Family Dwellings."
- D. Coordinate wall and roof 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.

3.2 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
 - 1. Fasten gypsum sheathing to wood framing with nails or screws.
 - 2. Fasten gypsum sheathing to cold-formed metal framing with screws.
 - 3. Install boards with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
 - 4. Install boards 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 boards without forcing. Abut ends of boards over centers of studs, and stagger end joints of adjacent boards not less than one stud spacing. Attach boards at perimeter and within field of board to each steel stud.
 - 1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of boards.
- D. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board 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 boards.
 - 2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

3.3 CEMENTITIOUS BACKER UNIT INSTALLATION

- A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.

3.4 FIBERBOARD SHEATHING INSTALLATION

- A. Comply with ASTM C 846 and with manufacturer's written instructions.

- B. Fasten fiberboard sheathing panels to intermediate supports and then at edges and ends. Use galvanized roofing nails; comply with manufacturer's recommended spacing and referenced fastening schedule. Drive fasteners flush with surface of sheathing and locate perimeter fasteners at least 3/8 inch from edges and ends.
- C. Install sheathing vertically with long edges parallel to, and centered over, studs. Install solid wood blocking where end joints do not occur over framing. Allow 1/8-inch open space between edges and ends of adjacent units. Stagger horizontal joints if any.
- D. Cover sheathing as soon as practical after installation to prevent deterioration from wetting.

END OF SECTION

SECTION 071900

WATERPROOFING

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.
- B. **LEED BUILDING - GENERAL REQUIREMENTS:**
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete waterproofing as shown on the drawings and/or specified herein, including but not limited to, the following:
 - 1. Waterproofing at elevator pit

1.03 RELATED WORK

- 1. Construction Waste Management and Disposal - Section 017419
- 2. Sustainable Design Requirements (LEED Building) - Section 018113
- 3. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3
- 4. Construction IAQ Requirements - Section 018119
- 5. Cast-in-place concrete - Section 033000.
- 6. Unit masonry- Section 042000.
- 7. Masonry Restoration and Cleaning - Section 049000
- 8. Building Insulation – Section 072100

9. Air & Vapor Barriers- Section 072700
10. Thermoplastic Membrane Roofing - Section 075400
11. Sheet Metal Work – Section 076200
12. Work in associated Divisions 21-23, 26-28.

1.04 SUBMITTALS

- A. Prior to commencing the Work, submit documentation from an approved independent testing laboratory certifying that the air leakage and vapor permeance rates of waterproofing including primary membrane and transition sheets, exceed the requirements of the National Building Code.
- B. Prior to commencing the Work submit copies of manufacturers' current ISO certification. Membrane, primers, sealants, adhesives and associated auxiliary materials shall be included.
- C. Prior to commencing the Work submit references clearly indicating that the membrane manufacturer has successfully completed projects on an annual basis of similar scope and nature for a minimum of three years. Submit references for a minimum of three projects.
- E. Submit manufacturer's technical, safety, and data sheets.

F. LEED BUILDING Submittal Requirements

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.

4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
5. Certification from the manufacturer that the product has achieved a Solar Reflective Index (SRI) equal to or greater than 78 for low-sloped roofs (slope \leq 2:12), and/or equal to or greater than 29 for steeped sloped roofs (Slope \geq 2:12) when tested in accordance with ASTM E 1980.

1.05 QUALITY ASSURANCE

- A. Submit in writing, a document stating that the applicator of the waterproofing membranes specified in this section is recognized by the manufacturer as suitable for the execution of the Work.
- B. Perform Work in accordance with the manufacturer's written instructions of barrier membrane and this specification.
- C. Maintain one copy of manufacturer's written instructions on site.
- D. At the beginning of the Work and at all times during the execution of the Work, allow access to Work site by the membrane manufacturers' representative.
- E. Components used in this section shall be sourced from one manufacturer, including sheet membrane, air/vapour barrier sealants, primers, mastics and adhesives.
- F. LEED BUILDING Performance Criteria:
The following criteria are REQUIRED for the products included in this section:
 1. Membrane roofing shall have a Solar Reflective Index (SRI) equal to or greater than 78 for low-sloped roofs (slope \leq 2:12), and/or equal to or greater than 29 for steeped sloped roofs (Slope \geq 2:12) when tested in accordance with ASTM E 1980.
 2. Materials in this section harvested and manufactured within 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements of this Section.
 3. Adhesives or sealants used for work in this section shall meet the requirements of Section 018113.3 : Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable. As per Section 018113.3 , sealants used as filler shall not exceed 250 grams per liter.

4. Certification of these products shall be in accordance with the Submittal Requirements of this Section.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the job site in undamaged and original packaging indicating the name of the manufacturer and product.
- B. Store materials in the original, unopened containers or packages, and under conditions recommended by manufacturer.
- C. Keep solvents away from open flame or excessive heat.
- D. Store adhesives and primers in compliance with manufacturer's recommendations.
- E. Store roll materials horizontally in original packaging.

1.07 PROJECT CONDITIONS

- A. Verify existing conditions and substrates before starting work
- B. All surfaces to receive waterproofing to be thoroughly dry and free of dew and/or frost
- B. Do not use materials that contain solvents, show sign of damage or are beyond their shelf life.
- C. Prior to and during application, all dirt and dust shall be removed from surfaces
- D. All surfaces not designed to receive the system shall be properly masked or otherwise protected against accidental spillage or application of the material to those areas
- E. Weather Conditions: Do not proceed with installation of waterproofing products when temperatures are in excess or below the manufacturer's recommendations. No installation work shall be performed during rainy or inclement weather and on frost or wet covered surfaces.

----- PART 2.00 - PRODUCTS -----

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with requirements, provide products of one of the following manufacturers:
 1. Bentonite waterproofing at all sides of elevator pit exterior
 - a. "CCW MiraClay" by Carlisle Coatings and Waterproofing
 - b. "Voltex" by CETCO

c. "Paraseal" by Tremco

d. Or approved equal

PART 3.00 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions where waterproofing is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.02 PREPARATION

- A. Before commencing work, ensure environmental and site conditions are suitable for installation of waterproofing membrane in compliance with manufacturer instructions.
- B. The substrate shall be clean and dry, free from surface water, ice, snow or frost, dust, dirt, oil, grease, curing compounds or any other foreign matter detrimental to the adhesion of the waterproofing membrane in compliance with manufacturer instructions
- C. Voids, cracks, holes and other damages horizontal or vertical surfaces shall be repaired before application of the membrane in compliance with manufacturer instructions

3.03 INSTALLATION

- A. General: conform to recommendations and published specifications of the manufacturers including environmental requirements

3.04 CLEANING

- A. Upon completion of waterproofing systems, remove all equipment, material and debris from the work and storage area, and leave those areas in an undamaged and acceptable condition.

END OF SECTION

THIS PAGE LEFT INTENTIONALLY BLANK

SECTION 072100

BUILDING INSULATION

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SECTION INCLUDES

- A. The Work of this Section includes all labor, materials, equipment, and services necessary to complete the building insulation as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Miscellaneous blanket insulation.
 - 2. Rigid insulation at slab or as otherwise noted on the drawings.
 - 3. Tapered rigid insulation as part of the roofing assemblies or as otherwise shown on the drawings.
 - 4. Attachment devices.

1.3 RELATED SECTIONS

- A. Construction Waste Management and Disposal - Section 017419
- B. Sustainable Design Requirements (LEED Building) - Section 018113
- C. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3
- D. Construction IAQ Requirements - Section 018119
- E. Cast in Place Concrete – Section 033000

- F. Rough Carpentry – Section 061000
- G. Finish Carpentry – Section 062000
- H. Exterior Insulation and Finish Systems – Section 072400
- I. Thermoplastic Membrane Roofing – Section 075400
- J. Firestops and Smoke seals - Section 078400.
- K. Joint Sealers – Section 079200
- L. Gypsum Drywall - Section 092500.

1.4 QUALITY ASSURANCE

A. LEED BUILDING Performance Criteria:

The following criteria are REQUIRED for the products included in this section:

1. Insulation materials shall contain recycled content as follows:
 - a. Fiberglass insulation shall contain a minimum of 20% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials).
 - b. Mineral-wool insulation shall contain a minimum of 75% (combined) post-industrial/post-consumer recycled content.
 - c. Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.
2. Insulation materials manufactured within a 500 mile radius of the project shall be documented in accordance with the submittal requirements of this Section
3. Adhesives or sealants used for work in this section shall meet the requirements of Section 018113.3 : Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
4. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.

1.5 SUBMITTALS

- A. Submit product data for each type of product indicated.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for insulation products.
- C.. LEED BUILDING Submittal Requirements:
The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the insulation product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s)
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
 3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
 4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
- 1.6 DELIVERY, STORAGE AND HANDLING
- A. Deliver materials to the site ready for use in the manufacturer's original and unopened containers and packaging, bearing labels as to type and brand. Delivered materials shall be identical to approved samples.
 - B. Store materials under cover in a dry and clean location, off the ground. Remove materials which are damaged or otherwise not suitable for installation and replace with acceptable materials.
 - C. Take every precaution to prevent the insulation from becoming wet, cover with tarps or other weather/watertight sheet goods.

PART 2 PRODUCTS

2.1 BLANKET INSULATION

- A. General: Provide flexible mineral fiber blankets/batts equal to "Thermafiber SAFB", as manufactured by Thermafiber, Roxul, or equal conforming to ASTM C 1104, ASTM E136, or ASTM C 665, Type I, Class A..

1. Insulation shall be foil scrim faced where indicated on the drawings.
2. Insulation shall have an R value of not less than 10 and shall be 2" thick unless otherwise noted on the drawings.

B. At Shaft Walls Only: use foil faced version of the same specified above.

2.2 RIGID INSULATIONS

A. Rigid Foam Insulation in applications as indicated on the drawings

1. Slab on Grade: 2" with R value of no less than 10 and 60 psi compressive strength.
2. Roof: as specified by roofing manufacturer.

B. Acceptable Manufacturers

1. Dow Industries
2. Owens Corning
3. Diversifoam
4. Or approved equal

2.3 ACCESSORIES

A. Clips for Securing Insulation to Encountered Surfaces: Spindle anchor and washer type consisting of perforated metal plates with spindle welded to center and snap on washers. Spindle and washers shall receive a corrosion-resistant electro-zinc plating. Adhesives or any other components for securing clips in place or properly completing the installation shall be recommended by the approved clip manufacturer.

1. Acceptable Manufacturers

- a. Miracle Adhesives Corp.
- b. Stic-Klip Mfg. Co., Inc.
- c. Midwest Fasteners

PART 3 EXECUTION

3.1 INSPECTION

A. Examine the areas and conditions where building insulation is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION OF RIGID INSULATION

A. General

1. Cooperate in the coordination and scheduling of the work of this section with the work of other sections so as not to delay job progress.
2. Install insulation in as large components as practical and to cover entire areas indicated on the drawings, closely butted together at sides and ends, and against walls, beams, etc. Neatly fit and cut insulation around all projections such as pipes, conduits, hangers and all other elements encountered in the field, which will result in complete coverage of the scheduled areas.
3. Discard, off the site insulation which becomes damaged during the course of installation, or is no longer in a physical condition to function for use intended, and replace with new material.
4. Clean surfaces on which adhesives are used to secure the insulation in place of dirt, grime, grease, oil and other foreign materials, to assure that the surfaces are properly prepared to accept the bond of the approved adhesives.
5. Exercise extreme care to avoid damage and soiling of faces on insulation units which will be exposed to view. Align joints accurately, with adjoining surfaces set flush.
6. Tape joints and ruptures in vapor barriers, using tape specified above, and seal each continuous area of insulation to surrounding construction so as to ensure vapor tight installation of the units.
7. Where insulation is impaled on stick clips, provide clips not less than 3" from corners or edges and not more than 12" o.c.
8. Comply with manufacturer's instructions for the particular conditions of installation in each case. If printed instructions are not available or do not apply to the project conditions, consult the manufacturer's technical representative for specific recommendations before proceeding with the work.
9. Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections which interfere with placement.
10. Apply a single layer of insulation to the required thickness, unless a double layer is required, to make up the total thickness shown.
11. Coordinate work with roofing assembly and warranty.

3.3 INSTALLATION OF BLANKET OR BATT FIBERGLASS INSULATION

- A. Install blanket fiberglass insulation in largest pieces as practical with edges closely butted. Cut and fit insulation to closely fit intersecting or penetrating surfaces.
 1. At shaft walls only, use foil-faced batt with barrier towards warm side, tape joints with 4" wide vapor proof aluminum tape applied over vapor barrier.

3.4 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

SECTION 072150

CLOSED-CELL SPRAY ON INSULATION

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SECTION INCLUDES

- A. The Work of this Section includes all labor, materials, equipment, and services necessary to complete the spray on insulation as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Spray-on thermal, closed-cell insulation as indicated on drawings.

1.3 RELATED SECTIONS

- A. Construction Waste Management And Disposal - Section 017419
- B. Sustainable Design Requirements (Leed Building) - Section 018113
- C. Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints And Coatings - Section 018113.3
- D. Construction IAQ Requirements – Section 018119
- E. Unit Masonry- Section 042000
- F. Vapor Barriers- Section 072700
- G. Firestops and Smoke seals- Section 078400

H. Gypsum Drywall – Section 09250

I. Divisions 21-23 and 26-28

1.4 QUALITY ASSURANCE

- A. Reference Standards: American Society for Testing and Materials (ASTM).
- B. Comply with requirements of 27-335.1 of the New York City 1968 Building Code.
- D. LEED BUILDING Performance Criteria:
The following criteria are REQUIRED for the products included in this section:
 - 2. Insulation materials manufactured within a 500 mile radius of the project shall be documented in accordance with the submittal requirements of this Section
 - 3. Adhesives or sealants used for work in this section shall meet the requirements of per Section 018113.3 Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
 - 4. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.

1.5 SUBMITTALS

- A. Product Data: Submit to the Commissioner catalog cuts, data sheets, and product literature from the proposed material manufacturers.
- B. LEED BUILDING Submittal Requirements:
The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 - 1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the insulation product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s)
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
 - 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.

3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the site, ready for use, in the manufacturer's original and unopened containers and packaging bearing labels as to type and brand. Delivered materials shall be identical to approved samples.
- B. Store materials under cover in a dry and clean location, off the ground. Remove materials which are damaged or otherwise not suitable for installation and replace with acceptable materials.
- C. Take every precaution to prevent the insulation from becoming wet; cover with tarps or other weather/watertight sheet goods.

PART 2 PRODUCTS

2.1 SPRAY-ON INSULATION

- A. Spray foam semi-open cell insulation shall be a 1.7 lb/ft³ spray-applied semi-rigid, low-density, air impenetrable cellular polyurethane soy-based plastic insulation produced in the field by combining a part A polymeric isocyanurate component with a part B resin-based component. The material shall be job-site mixed in and spray applied by and through equipment designed especially for this purpose.
- B. Material shall have a Class 1, Class A flame spread and smoke developed of <450 when tested per ASTM E 84, UL 723 and NFPA-255, and a minimum R value of 5/inch.
- C. Provide adhesive as recommended by the manufacturer for application to structural deck prior to application of insulation.
- D. Apply insulation to a minimum thickness of 3", unless otherwise noted.
- E. Acceptable Manufacturers
 1. BioBased 1701

2. Urethane Soy System
3. Foam-Pro Insulating Systems
4. or approved equal.

PART 3. EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where spray-on insulation is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Cover other work which might be damaged by fall-out or overspray of materials during spraying operations. Provide temporary enclosure as may be required to confine operations, protect the environment, and ensure ambient conditions and substrate temperature and other conditions as recommended by the manufacturer of the sprayed-on material.
- B. Comply with manufacturer's instructions for particular conditions of installation. Consult with manufacturer's technical representative for conditions not covered by printed instructions. Material and water ratio shall be mechanically controlled on site.
- C. Coat substrate with bonding adhesive where use of adhesive is required or recommended by manufacturer. Apply abrasion resistant coating to all surfaces in accordance with manufacturer's recommendations.
 1. Clean surfaces to receive fireproofing as required to remove any material detrimental to bond of insulation to substrate.
- D. Provide thicknesses as shown on drawings. Extend insulation full thickness over entire area scheduled to receive same. Except as otherwise indicated or recommended by manufacturer, install body of insulation covering material in a single course.

END OF SECTION

SECTION 072400

EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS)

PART 1.00 - GENERAL

1.01 GENERAL REQUIREMENTS

A.1 RELATED DOCUMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.02 WORK INCLUDED

- A. The Work of this Section includes all labor, materials, equipment and services necessary to complete the building insulation as shown on the drawings and/or specified herein, including but is not limited to, the following:
 - 1. EFIS assembly.

1.03 RELATED WORK

- 1. Construction Waste Management And Disposal - Section 017419
- 2. Sustainable Design Requirements (LEED Building) - Section 018113
- 3. Volatile Organic Compound (Voc) Limits For Adhesives, Sealants, Paints And Coatings - Section 018113.3
- 4. Construction IAQ Requirements – Section 018119
- 5. Unit Masonry – Section 042000
- 6. Sheathing – Section 061600
- 7. Thermoplastic Membrane Roofing – Section 075400

8. Sheet Metal Flashing – Section 076200
9. Roof Specialties and Accessories – Section 077200

1.04 QUALITY ASSURANCE

A. LEED BUILDING - GENERAL REQUIREMENTS:

The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

B. Reference Standards

A. ASTM Standards:

1. B 117 Test Method for Salt Spray (Fog) Testing
2. C 578 Specification for Preformed, Cellular Polystyrene Thermal Insulation
3. C 1177 Specification for Glass Mat Gypsum for Use as Sheathing
4. C 1382 Test Method for Determining Tensile Adhesion Properties of Sealants When Used in Exterior Insulation and Finish Systems (EIFS) Joints
5. D 522 Test Methods for Mandrel Bend Test of Attached Organic Coatings
6. D 882 Standard Test Methods for Tensile Properties of Thin Plastic Sheet
7. D 968 Test Method for Abrasion Resistance of Organic Coatings by Falling Abrasive
8. D 1784 Specification for Rigid Poly (Vinyl Chloride) (PVC) and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
9. D 2247 Practice for Testing Water Resistance of Coatings in 100% Relative Humidity
10. D 3273 Test for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
11. E 84 Test Method for Surface Burning Characteristics of Building Materials
12. E 96 Test Methods for Water Vapor Transmission of Materials
13. E 119 Method for Fire Tests of Building Construction and Materials
14. E 283 Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Differences Across the Specimen
15. E 330 Test Method for Structural Performance of Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
16. E 331 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
17. E 1233 Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Cyclic Static Air Pressure Difference
18. E 2098 Test Method for Determining Tensile Breaking Strength of Glass Fiber Reinforcing Mesh for Use in Class PB Exterior Insulation and Finish System after Exposure to a Sodium Hydroxide Solution
19. E 2134 Test Method for Evaluating the Tensile-Adhesion Performance of an Exterior Insulation and Finish System (EIFS)

20. E 2273 Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish System (EIFS) Clad Wall Assemblies
21. E 2430 Specification for Expanded Polystyrene (EPS) Thermal Insulation Boards for use in Exterior Insulation and Finish Systems (EIFS)
22. E 2485 Standard Test Method for Freeze/Thaw Resistance of Exterior Insulation and Finish Systems (EIFS) and Water Resistive Barrier Coatings
23. E 2486 Standard Test Method for Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS)
24. E 2570 Test Method for Water-Resistive (WRB) Coatings used Under Exterior Insulation and Finish Systems (EIFS) or EIFS with Drainage
25. G 153 Recommended Practice for Operating Light-and Water-Exposure Apparatus (Carbon-Arc Type) for Exposure of Nonmetallic Materials
26. G 154 Recommended Practice for Operating Light-and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials

B. Building Code Standards

1. AC235 Acceptance Criteria for EIFS Clad Drainage Wall Assemblies (April, 2008)

C. National Fire Protection Association (NFPA) Standards

1. NFPA 268, "Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source"
2. NFPA 285, "Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Non-Load-Bearing Wall Assemblies containing Combustible Components Using the Intermediate-Scale, Multistory Test Apparatus"

D. Other Referenced Documents

1. American Association of Textile Chemists and Colorists AATCC-127 Water Resistance: Hydrostatic Pressure Test
2. GA-600 Fire Resistance Design Manual
3. APA Engineered Wood Association E 30, Engineered Wood Construction Guide
4. ICC-ES ESR-1748, Evaluation Report for StoTherm® NExT™ EIFS.
5. ICC-ES ESR-1233, Evaluation Report for StoGuard™

- B. Fire Performance Characteristics: Provide insulation materials identical to those whose indicated fire performance characteristics have been determined per the ASTM test method indicated below, by UL or other testing and inspecting organizations acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing and inspecting organization.

1. Surface Burning Characteristic ASTM E 84.
2. Fire Resistance Ratings ASTM E 119.
3. Combustion Characteristics ASTM E 136.

C. Manufacturer requirements

1. Member in good standing of the EIFS Industry Members Association (EIMA).
2. System manufacturer for a minimum of three (3) years.
3. Manufacturing facilities ISO 9001:2000 Certified Quality System.
4. Manufacturer's wall assembly listed in Gypsum Association Fire Resistance Design Manual.

D. Contractor requirements

1. Engaged in application of EIFS for a minimum of three (3) years.
2. Knowledgeable in the proper use and handling of EIFS materials, possessing certificate of completion for EIFS on-line applicator test.
3. Employ skilled mechanics who are experienced and knowledgeable in EIFS application, and familiar with the requirements of the specified work.
4. Successful completion of minimum of three (3) projects of similar size and complexity to the specified project.
5. Provide the proper equipment, manpower and supervision on the job site to install the system in compliance with the manufacturer's published specifications and details and the project plans and specifications.

E. Insulation board manufacturer requirements

1. Recognized by EIFS as capable of producing insulation board to meet system requirements, and hold a valid licensing agreement with EIFS.
2. Listed by an approved agency.
3. Label insulation board with information required by EIFS, the approved listing agency and the applicable building code.

F. Mock-up Testing

1. Construct full-scale mock-up of typical EIFS/window wall assembly with specified tools and materials and test air and water infiltration and structural performance in accordance with ASTM E 283, E 331 and E 330, respectively, through independent laboratory. Mock-up shall comply with requirements of project specifications. Where mock-up is tested at job site maintain approved mock-up at site as reference standard. If tested off-site accurately record construction detailing and sequencing of approved mock-up for replication during construction.

G. Inspections

1. Provide independent third party inspection where required by code or contract documents.
2. Conduct inspections in accordance with code requirements and contract documents.

- H. Single-Source Responsibility for Insulation Products: Obtain each type of building insulation from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

1.05 SUBMITTALS

A. LEED BUILDING Submittal Requirements:

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications.
2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION
4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the LEED Consultant for review.

A. Samples

Submit 12" x 12" sample of each assembly component. Include representative samples of installation devices and accessories.

- B. Mockups: Build mockups to extent necessary, 3'-4' minimum, to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

C. Product Literature

1. Submit to the Resident Engineer product test reports from and based on tests performed by qualified independent testing laboratory evidencing compliance of insulation products with requirements including r-values (aged values for plastic foam insulations), fire performance characteristics, perm ratings, water absorption ratings, and other properties, based on comprehensive testing of current products.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the site ready for use in the manufacturer's original and unopened containers and packaging, bearing labels as to type and brand. Delivered materials shall be identical to approved samples.
- B. Store materials under cover in a dry and clean location, off the ground. Remove materials which are damaged or otherwise not suitable for installation and replace with acceptable materials.

- C. Take every precaution to prevent the insulation from becoming wet, cover with tarps or other weather/watertight sheet goods.

PART 2.00 - PRODUCTS

2.01 GENERAL

- A. It is the intention of this project to achieve LEED Material Resource Credit 4.2 for the use of Recycled Content. Selection of materials specified or otherwise used in this project is to maximize recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes 20% based on cost, of the total value of materials on the project. The General Contractor is required to comply with or exceed the standard set by this criteria.

2.02 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide insulation products of one of the following or an approved equal.

1. Basis-of-Design Product: Subject to compliance with requirements, provide the following EIFS insulating and finish assembly:

- a. STO Corp. Sto *Classic Next* assembly, face color to match sample provided by Commissioner.

2. Alternate Products:

- A. Senergy Senerflex Channeled Adhesive Design water draining Class PB Exterior Insulation and Finish System.
- B. Parex Optimum WaterMaster EIFS system.
- C. or Approved Equal.

3. Air/Moisture Barrier

- A. StoGuard Senershield R, Parex Optimum Basecoat for masonry and Parex KeyGuard 495 for stud walls or approved equal.
- a. Waterproof Coating: Sto Gold Coat or approved equal—ready mixed waterproof coating for wall substrates and sheathings.

4. Adhesive

- A. Cementitious Adhesives
1. Sto BTS Plus, Senergy Alpha Dry, Parex Optimum Basecoat or equivalent from alternate manufacturers, or approved equal—one-component, polymer-modified, cement based high build adhesive (for use over exterior glass mat faced gypsum sheathing (compliant with ASTM C 1177), exterior cementitious sheathing, concrete, masonry or cement plaster surfaces. Also used

over exterior or Exposure I OSB and plywood sheathing when protected with StoGuard™).

5. Insulation Board

- A. Nominal 1.0 lb/ft³ (16 kg/m³) Expanded Polystyrene (EPS) insulation board in compliance with ASTM E 2430 and ASTM C 578 Type I requirements

6. Base Coat

- A. Cementitious Base Coats
 - 1. Sto BTS® Plus, Senergy Alpha Dry, Parex Optimum Basecoat, or equivalent from alternate manufacturers, or approved equal

7. Reinforcing Meshes

- A. Ultra-High Impact Mesh
 - 1. Sto Armor Mat XX, Senergy High Impact 20 and Senergy FlexGuard 4, Parex 358.14 15 oz mesh or equivalent from alternate manufacturers, or approved equal--nominal 15 oz./yd² (509 g/m²), ultra-high impact, double strand, interwoven, open-weave glass fiber fabric with alkaline resistant coating for compatibility with Sto materials.

8. Specialty Meshes

- A. Sto Corner Mat, Senergy Corner Mesh, Parex 357 corner mesh or equivalent from alternate manufacturers, or approved equal--nominal 9.0 oz./yd² (306 g/m²), pre-creased, heavy-duty, open-weave woven glass fiber fabric with alkaline resistant coating for compatibility with Sto materials

9. Primer

- A. Sto Primer Sand, Senergy Tinted Primer, Parex 310 primer, or equivalent from alternate manufacturers, or approved equal-acrylic based tintable primer with sand for roller application.

10. Finish Coat

- A. Stolit, Senergy Senerflex Finish, Parex Optimum Finish or equivalent from alternate manufacturers, or approved equal-acrylic based textured wall coating with graded marble aggregate.

11. Sealer

- A. CR 512 STO Clear Coat Sealer, Parex 610 Matte sealer or equivalent from alternate manufacturers, or approved equal

12. Job Mixing Ingredients

- A. Water-Clean and potable.

- B. Portland cement-Type I, Type II, or Type I-II in conformance with ASTM C 150.

13. Accessories

- A. Starter Track- Rigid PVC (polyvinyl chloride) plastic track Part No. STDE as furnished by Plastic Components, Inc., or approved equal.

2.03 INSULATING MATERIALS

- A. General: Provide insulating materials that comply with requirements and with referenced standards.

1. EFIS system at existing masonry and new stud wall assemblies.

PART 3.00 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions where building insulation is to be installed and notify the Resident Engineer of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.02 INSTALLATION

- A. General

1. Cooperate in the coordination and scheduling of the work of this section with the work of other sections so as not to delay job progress.
2. Install insulation in as large components as practical and to cover entire areas indicated on the drawings, closely butted together at sides and ends, and against walls, beams, etc. Neatly fit and cut insulation around all projections such as pipes, conduits, hangers and all other elements encountered in the field, which will result in complete coverage of the scheduled areas.
3. In accordance with Waste Management Practices, discard, off-site, insulation which becomes damaged during the course of installation, or is no longer in a physical condition to function for use intended, and replace with new material.
4. Clean surfaces on which adhesives are used to secure the insulation in place of dirt, grime, grease, oil and other foreign materials, to assure that the surfaces are properly prepared to accept the bond of the approved adhesives.
5. Exercise extreme care to avoid damage and soiling of faces on insulation units which will be exposed to view. Align joints accurately, with adjoining surfaces set flush.

12/21/2012

6. Set vapor barrier faced units with vapor barrier to inside of construction, except as otherwise shown. Do not obstruct ventilation spaces. All joints in vapor barriers shall be sealed with 4" wide, foil faced duct tape to prevent vapor and air migration.
7. Tape joints and ruptures in vapor barriers, using tape specified above, and seal each continuous area of insulation to surrounding construction so as to ensure vapor tight installation of the units.
8. Where insulation is impaled on stick clips, provide clips not less than 3" from corners or edges and not more than 12" o.c.
9. Comply with manufacturer's instructions for the particular conditions of installation in each case. If printed instructions are not available or do not apply to the project conditions, consult the manufacturer's technical representative for specific recommendations before proceeding with the work.
10. Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections which interfere with placement.
11. Apply a single layer of insulation to the required thickness, unless a double layer is required, to make up the total thickness shown.

3.05 PROTECTION

- A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 072700

VAPOR BARRIERS

PART 1.00 - GENERAL

1.01 RELATED DOCUMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.02 WORK INCLUDED

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete waterproofing as shown on the drawings and/or specified herein, including but not limited to, the following:
 - 1. 3-ply polyethylene reinforced vapor barrier at underside of slab.
 - 2. 3-ply polyethylene reinforced vapor barrier at exterior windows, doors and storefront installation.
 - 3. Vapor Permeable Sheet Membrane Air-Barrier at Elevator shaft wall.

1.03 RELATED WORK

- 1. Cast-in-place concrete - Section 033000.
- 2. Unit masonry- Section 042000.
- 3. Masonry Restoration and Cleaning - Section 049000
- 4. Rough Carpentry – Section 061000

5. Waterproofing - Section 071900
6. Building Insulation – Section 072100
7. Sheet Metal Flashing – Section 076200
8. Aluminum Framed Entrances and Storefront – Section 084113
9. Aluminum Windows and Doors – Section 085113
10. Work in associated Divisions 21-23, 26-28

1.04 SUBMITTALS

- A. Prior to commencing the Work, submit documentation from an approved independent testing laboratory certifying that the air leakage and vapor permeance rates of waterproofing including primary membrane and transition sheets, exceed the requirements of the National Building Code.
- B. Prior to commencing the Work submit copies of manufacturers' current ISO certification. Membrane, primers, sealants, adhesives and associated auxiliary materials shall be included.
- C. Prior to commencing the Work submit references clearly indicating that the membrane manufacturer has successfully completed projects on an annual basis of similar scope and nature for a minimum of three (3) years. Submit references for a minimum of three (3) projects.
- D. Prior to commencing the Work submit manufacturers' complete set of standard details for the waterproofing systems showing a continuous plane of air tightness throughout the building envelope.
- E. Submit manufacturer's technical, safety, and data sheets.
- F. LEED BUILDING Submittal Requirements:
The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications.
 2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.

3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION
4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the LEED Consultant for review.

1.06 QUALITY ASSURANCE

- A. Submit in writing, a document stating that the applicator of the waterproofing membranes specified in this section is recognized by the manufacturer as suitable for the execution of the Work.
- B. Perform Work in accordance with the manufacturer's written instructions of barrier membrane and this specification.
- C. Maintain one copy of manufacturer's written instructions on site.
- D. At the beginning of the Work and at all times during the execution of the Work, allow access to Work site by the membrane manufacturers' representative.
- E. Components used in this section shall be sourced from one manufacturer, including sheet membrane, air/Vapor barrier sealants, primers, mastics and adhesives.
- F. **LEED BUILDING - GENERAL REQUIREMENTS:**
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the job site in undamaged and original packaging indicating the name of the manufacturer and product.

- B. Store materials in the original, unopened containers or packages, and under conditions recommended by manufacturer.
- C. Store liquid air/Vapor barrier material, adhesives and primers at temperatures of 5°C and above to facilitate handling.
- D. Cold applied elastomeric membrane should be stored in closed containers outdoors.
- E. Keep solvents away from open flame or excessive heat.
- F. Store adhesives and primers at temperatures of 5°C and above to facilitate handling.
- G. Store roll materials horizontally in original packaging.

1.08 PROJECT CONDITIONS

- A. Verify existing conditions and substrates before starting work
- B. All surfaces to receive waterproofing to be thoroughly dry and free of dew and/or frost
- B. Do not use materials that contain solvents, show sign of damage or are beyond their shelf life.
- C. Prior to and during application, all dirt and dust shall be removed from surfaces
- D. All surfaces not designed to receive the system shall be properly masked or otherwise protected against accidental spillage or application of the material to those areas
- E. Weather Conditions: Do not proceed with installation of waterproofing products when temperatures are in excess or below the manufacturer's recommendations. No installation work shall be performed during rainy or inclement weather and on frost or wet covered surfaces.

PART 2.00 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with requirements, provide products of one of the following manufacturers:
 - 1. 3-ply polyethylene reinforced vapor barrier at slab on grade
 - a. Griffolyn, Inc.
 - b. Raven Industries
 - c. Global Plastic Sheeting

- d. Approved equal
- 2. 3-ply polyethylene reinforced vapor barrier at exterior windows, doors and storefront installation
 - a. Griffolyn, Inc.
 - b. Raven Industries
 - c. Global Plastic Sheeting
 - d. Approved equal
- 3. Vapor Permeable Air-Barrier at Elevator Shaft Wall.
 - a. Basis of Design: Blueskin VP 160 by Henry Company.
 - 1. Alternate Manufacturers: Tremco, Griffolyn Inc, or approved equal.

PART 3.00 - EXECUTION

3.01 EXAMINATION

- A. Examine areas and conditions where waterproofing is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.02 PREPARATION

- A. Before commencing work, ensure environmental and site conditions are suitable for installation of waterproofing membrane.
- B. The substrate shall be clean and dry, free from surface water, ice, snow or frost, dust, dirt, oil, grease, curing compounds or any other foreign matter detrimental to the adhesion of the waterproofing membrane.
- C. Voids, cracks, holes and other damages horizontal or vertical surfaces shall be repaired before application of the membrane.

3.03 INSTALLATION

- A. General: conform to recommendations and published specifications of the manufacturers including environmental requirements

3.04 CLEANING

- A. Upon completion of waterproofing systems, remove all equipment, material and debris from the work and storage area, and leave those areas in an undamaged and acceptable condition.

END OF SECTION

SECTION 075400

THERMOPLASTIC MEMBRANE ROOFING

1 PART - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and coordination of work shown in the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Adhered membrane roofing system
 - 2. Substrate and cover boards
 - 3. Roof insulation
 - 4. Vapor Barrier
 - 5. Testing.
 - 6. Maintenance Pads
- B. This section includes coordination and installation of roof membrane, associated accessories and roof pavers suitable to accept pre-planted module trays at a later date.
- C. Related Sections include the following:
 - 1. Construction Waste Management and Disposal - Section 017419
 - 2. Sustainable Design Requirements (LEED Building) - Section 018113

3. (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3
4. Construction IAQ Requirements - Section 018119
5. Unit Masonry– Section 042000
6. Masonry Restoration and Cleaning – Section 049000
7. Rough Carpentry – Section 061000
8. Sheathing – Section 061600
9. Building Insulation – Section 072100
10. Exterior Insulation and Finish Systems – Section 072400
11. Sheet Metal Flashing – Section 076200
12. Flexible Flashing – Section 076500
13. Joint Sealers - Section 079200
14. Work in associated Divisions 21-23, 26-28.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing membrane manufacturer based on testing and field experience.
- C. Roofing System Design: Provide a membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure listed here:
 1. Corner Uplift Pressure: 55 lb/sf
 2. Perimeter Uplift Pressure: 45 lb/sf
 3. Field-of-Roof Uplift Pressure: 30lb/sf.

- D. Provide a roof system in which all component layers are fully adhered to the roof substrate and to each other. If existing substrates prove to be unacceptable to the roof manufacturer to receive a fully adhered system, provide mechanical attachments to the roof substrate according to the manufacturer's recommendations. Use fasteners compatible with the specific roof substrate to be covered.
- F. LEED BUILDING Performance Criteria:
The following criteria are REQUIRED for the products included in this section:
1. Membrane roofing shall have a Solar Reflective Index (SRI) equal to or greater than 78 for low-sloped roofs (slope $\leq 2:12$), and equal to or greater than 29 for steeped sloped roofs (Slope $\geq 2:12$) when tested in accordance with ASTM E 1980.
 2. Roofing products manufactured within 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements of this section.
 3. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.

1.4 SUBMITTALS

- A. Product Data: For each type of roofing product specified. Include data substantiating that materials comply with requirements.
- B. Shop Drawings: For roofing system. Include plans, elevations, sections, details and attachments to other Work.
1. Base Flashings
 2. Insulation and cover board layout, and if applicable, fastening patterns.
- C. Samples for Verification: Of the following products:
1. 12-by-12-inch-square sample of sheet roofing, of color specified, including T-shaped side and end lap seam.
 2. 12-by-12-inch-square sample of insulation.
 3. 12-by-12-inch-square sample of cover board.
 4. 12-by-12-inch-square sample of vapor barrier.
 5. 12-by-12-inch length of metal termination bars.

6. If fasteners are used:
 - a. Six insulation fasteners of each type, length and finish
 - b. Six roof cover fasteners of each type, length, and finish.
 7. Pre-Cast maintenance pads from standard selection available from or approved by roofing manufacturer.
 8. Manufacturer will provide written confirmation of acceptable specifications for future planting trays, matrix and sedum to be provided by other and/or source acceptable to roofing manufacturer and methodology required to maintain roofing warranty.
- C. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install specified roofing system.
- D. Manufacturer Certificates: Signed by roofing system manufacturer certifying that the roofing system complies with requirements specified in the "Performance Requirements" Article. Upon request, submit evidence of complying with requirements.
1. Submit evidence of meeting performance requirements.
- E. Qualification Data: For Installer and Manufacturer.
- F. Maintenance Data: For roofing system to include in the maintenance manuals.
- G. Warranty: Copies of special manufacturer's and Installer's warranties stating obligations, remedies, limitations, and exclusions: submit these for negotiation and approval by the City of New York before executing of the Contract. Exclusions and limitations not communicated to the City of New York in writing before execution of the Contract shall not be binding on the City of New York.
- H. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roof installation.
- I. LEED BUILDING Submittal Requirements:
The contractor or subcontractor shall submit the following LEED BUILDING certification items:
1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the insulation product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw

materials used to manufacture the product(s)

- c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the product information supplied for the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM.
3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as stated in this Section. Cut sheets shall be submitted with the Construction Manager or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
5. Certification, from the manufacturer, that material has achieved a Solar Reflective Index (SRI) equal to or greater than 78 for low-sloped roofs (slope \leq 2:12), and equal to or greater than 29 for steeped sloped roofs (Slope \geq 2:12) when tested in accordance with ASTM E 1980.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product.

- a. The contractor or subcontractor performing the work of this section must, within the last five (5) consecutive years prior to the bid opening, have successfully completed in a timely fashion at least three (3) projects similar in scope and type to the required work.

B. Manufacturer's Qualifications:

- a. The manufacturer providing the material or equipment specified in this section must, for the past five (5) years, have been regularly engaged in the manufacture of material or equipment similar in type to that required for this Project. Such similar material or equipment provided by the manufacturer must have been in satisfactory service for not less than five (5) years.

C. Source Limitations: Obtain components for membrane roofing approved by membrane roofing manufacturer.

- D. Fire-test-response characteristics indicated as determined by testing identical products per test method below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.
1. Exterior Fire-Test Exposure: Class A; ASTM E 108, for applications and roof slopes indicated.
- E. Pre-Installation Conference: Before starting roof deck construction, conduct conference at Project site. Meet with the same participants and review the same items listed for the pre-installation conference. In addition, review status of submittals and coordination of work related to roof construction. Notify participants at least 5 working days before conference.
1. Meet with The City of New York, The Commissioner, the City of New York's insurer if applicable, testing and inspecting agency representative, roofing installer, roofing system manufacturer's representative, and installers whose work interfaces with or affects roofing including installers or roof accessories and roof-mounted equipment.
 2. Review methods and procedures related to roofing 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 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, and conditions of other construction that will affect roofing system.
 7. Review governing regulations and requirements for insurance and certificates if applicable.
 8. Review temporary protection requirements for roofing system during and after installation.
 9. Review roof repair procedures after roofing installation.

1.6 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 date, date of manufacturer, and direction 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. Protect stored liquid materials from direct sunlight.
 - 1. 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. Store in a dry location. 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.

1.7 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with roofing work only when existing and forecasted weather conditions permit roofing to be installed according to manufacturers' written instructions and warranty requirements.

1.8 SEQUENCING AND SCHEDULING

- A. Sequence installation of modified bituminous sheet roofing with related units of Work specified in other Sections to ensure that roof assemblies, including roof accessories, flashing, trim, and joint sealers, are protected against damage from effects of weather, corrosion, and adjacent construction activity.

1.9 WARRANTY AND GUARANTEE

- A. Special Warranty: Manufacturer's standard form, without monetary limitations, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks.
 - 1. Special warranty includes roofing membrane, base flashings, roof insulations, fasteners, cover boards, and vapor barrier and other components of membrane roofing system and related components provided by the roofing manufacturer.
 - 2. Insulation shall retain 80 percent of original published thermal value.

3. Warranty may not contain limits on replacements cost ("no dollar limit" warranty required).
 4. Warranty may not include provisions pro-rating value of roof system over the warranty period.
 5. Wind speed limitation: not less than 110 mph 3-second gust at 10 meters above grade.
 6. Warranty shall be transferable with ownership of the building.
 7. Warranty Period: 20 years from date of Substantial Completion.
- B. Special Installer's Warranty: Written waterproofing Installer's warranty, signed by Installer, covering Work of this Section, terms and requirements matching those given above of manufacturer's Warranty, for warranty period of two (2) years from date of Substantial Completion.

2 PART - PRODUCTS

2.1 THERMOPLASTIC POLYOLEFIN ROOFING MEMBRANE

- A. Fabric-Reinforced Thermoplastic Polyolefin Sheet: Uniform, flexible sheet formed from a thermoplastic polyolefin, internally fabric or scrim reinforced, and as follows:
1. Manufacturer:
 - a. Basis of Design: Carlisle SureWeld
 - b. Thickness: 60 mils nominal
 - d. Exposed Face Color: White
 1. Approved Alternate Sources:
 - a. Dow Tiempo
 - b. Henry
 - d. or approved equal

2.2 AUXILLIARY MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with selected membrane roofing.
1. Liquid-type auxiliary materials shall meet VOC limits of authorities having jurisdiction.

- B. Sheet Flashing: Manufacturer's standard unreinforced thermoplastic polyolefin sheet flashing, 55 mils thick, minimum, of same color as sheet membrane.
- C. Substrate primers: Manufacturer's standard products, as recommended for various substrates.
- D. Adhesive: low-rise foam polyurethane adhesive; "FAST 100" by Carlisle or equal by selected roofing manufacturer.
- E. Bonding Adhesive: Manufacturer's standard bonding adhesive(s) for membranes, cover and substrate boards, insulation, and base flashings.
- F. Metal Termination Bars: Manufacturer's standard bonding adhesive(s) for membranes, cover and substrate boards, insulation, and base flashings.
- G. Fasteners: System is anticipated to be adhesively attached; use of fasteners is permitted only by prior agreement with the Commissioner, after investigation of fastening system and its proven success on the existing substrate. All fasteners must be verified by field pull-out tests conducted by the fastener manufacturer at the direction of the Commissioner.
 - 1. Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacture.
 - 2. Use manufacturer-approved #14 threaded fasteners for concrete substrates.
- H. Miscellaneous Accessories as required by selected manufacturer: Provide pourable sealers, preformed one and vent sheets flashings, preformed inside and outside corner sheet flashings, T-joint covers, termination reglets, cover strips, and other accessories.
 - 1. Use: Finish ply of 2-ply, modified bituminous membrane roofing.
 - 2. Reinforcing: Composite woven or nonwoven polyester and glass-fiber mat.
 - 3. Granule Color: Gray.

2.3 VAPOR BARRIERS

- A. Self-adhering sheet membrane, 40 mil thick composite consisting of a 32mil self-adhering rubberized asphalt membrane laminated to an 8-mil spunbonded polyester fabric, approved for application by selected roofing manufacturer.
 - 1. Carlisle SynTec "CCW-725"
 - 2. Johns Manville

3. Griffolyn, Inc.

4. or approved equal

2.4 ROOF INSULATION

A. General: Provide pre-formed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thickness indicated.

B. Polyisocyanurate Tapered Insulation: ASTM C 1289, Type II, glass fiber mat facer on both major surfaces, approved for application by selected roofing manufacturer.

1. Manufacturer:

a. Carlisle SynTec Incorporated

b. Henry

c. Dow Industries

d. or approved equal

2.5 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacture for intended use and compatible with membrane roofing.

B. Cold Fluid-Applied Adhesive: Manufacturer's standard cold fluid-applied adhesive formulated to adhere roof insulation to substrate.

C. Substrate and Cover Board: ASTM C 1177/C 1177M, glass mat, water-resistant gypsum substrate, Type X, 5/8" thick.

1. Product: Subject to compliance with requirements of selected roofing manufacturer, provide "Dens-Deck" by Georgia Pacific Corporation.

2. Temple Inland

3. National Gypsum

4. or approved equal

2.6 PROTECTION BOARD

- A. General: Furnish roofing insulation accessories recommended by manufacturer for intended use and compatible with sheet roofing material and applied pavers.

2.7 MAINTENANCE PADS

- A. General: Furnish maintenance pads and associated pedestal setting accessories as recommended by selected roofing manufacturer for intended use and compatible with sheet roofing assembly and warranty.

3 PART - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting the performance of the roofing system:
 - 1. Verify that roof openings and penetrations are in place and set.
 - 2. Verify existing substrates are sound and free of broken tiles, spalled concrete, and other conditions which may prevent proper installation of the roof system.
 - 3. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thickness of insulation.
 - 4. Verify that surface plane flatness and fastening of steel roof deck comply with requirements in Division 5, *Steel Deck*.
 - 5. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
 - 6. Verify that concrete curing compounds that will impair adhesion of roofing components to roof deck have been removed.
 - 7. Verify that substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.
 - 8. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture and other substances detrimental to roofing installation according to roofing manufacturer's written instructions. Remove sharp projections.

- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roof.
- D. Install acoustical roof deck rib insulation strips, specified in Division 5, *Steel Deck*, according to acoustical roof deck manufacturer's written instructions.

3.3 SUBSTRATE BOARD INSTALLATION

- A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
- B. If mechanical fastening is required.
 - 1. Fasten substrate board to top flanges of steel deck according to recommendations in FMG's "Approval Guide" for specified Windstorm Resistance Classification.
 - 2. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to membrane roofing system manufacturer's written instructions.

3.4 VAPOR-RETARDER INSTALLATION

- A. Surface Preparation: Concrete shall be in place for 7 days minimum. Substrate must be completely dry. Surface shall have a smooth finish free of voids, sharp protrusions, laitance and form release agents. Remove all materials from substrates that contain coal tar or polysulfides, and clean surfaces thoroughly. Block or brick walls shall have mortar joints struck flush.
- B. Priming: Surfaces to receive vapor barrier must be clean and dry. Prime concrete, masonry and exterior gypsum substrates with manufacturer-recommended primer, following manufacturer's application directions. If necessary, protect primed area from dust and debris; re-prime if area becomes dirty.
- C. Application: Apply vapor barrier in lengths of 8' or less. Overlap edge seams 2-1/2" and end laps 5". Begin installation at base of roof/wall and work upwards, so that laps shed water. On walls above 8', apply in 8' sections, starting at the lowest point with the higher section

overlapping the lower section 5". Use a suitable roller to press membrane firmly against the substrate.

3.5 INSULATION INSTALLATION

- A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with roofing system manufacturer's written instructions for installing roofing insulation.
- C. Install one or more layers of insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2 inches (50 mm) or greater, install required thickness in 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.
- D. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding ¼ inch with insulation.
 - 1. Cut and fit insulation within ¼" of nailers, projections and penetrations.
- E. Adhered insulation: Install each layer of insulation and adhere to substrate as follows:
 - 1. Set each layer of insulation in a cold fluid-applied adhesive.
- F. Mechanically Fastened and Adhered Insulation: Install each layers of insulation and secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - 1. Fasten first layer of insulation according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.
 - 2. Fasten first layer of insulation to resist uplift pressure at corner, perimeter, and field of roof.
 - 3. Install subsequent layers of insulation in a cold fluid-applied adhesive.
- G. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Stagger joints from joints in insulation below a minimum of 6" in each direction. Loosely butt cover boards together and fasten to roof deck.
 - 1. Fasten according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.
 - 2. Fasten to resist uplift pressure at corner, perimeter, and field of roof.

3.6 ADHERED ROOFING MEMBRANE INSTALLATION

- A. Install roofing membrane over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll roofing membrane and allow to relax before installing.
- B. Start installation of roofing membrane in presence of membrane roofing system manufacturer's technical personnel.
- C. Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D. Bonding Adhesive: Apply solvent-based bonding adhesive to substrate and underside of roofing membrane at rate required by manufacturer and allow to partially dry before installing roofing membrane. Apply water-based bonding adhesive to substrate at rate required by manufacturer and immediately install roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.
- E. Adhesively (or, with the Commissioner's permission, mechanically) fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing.
- F. Apply roofing membrane with side laps shingled with slope of roof deck where possible.
- G. Seams: Clean seams areas, overlap roofing membrane, and hot air weld side and end laps of roofing membrane according to manufacturer's written instructions to ensure a water-tight seam installation.
 - 1. Test lap edges with probers to verify seam weld continuity. Apply lap sealant to seal cut edges of roofing membrane.
 - 2. Verify field strength of seams a minimum of twice daily and repair seam samples areas.
 - 3. Repair tears, voids and lapped seams in roofing membrane that does not meet requirements.
- H. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.
- I. Install roofing membrane and auxiliary materials to tie into existing and adjacent roofing and flashing systems.

3.7 BASE FLASHING INSTALLATION

- A. Install sheet flashings and adhere to substrates according to membrane roofing system manufacturer's written instructions.
- B. Apply solvent-based bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with sheet flashing.
- D. Clean seam areas and overlap and firmly roll sheet flashings into the adhesive. Weld side and end laps to ensure a watertight seam installation.
- E. Terminate and seal top of sheet flashings and, if appropriate, mechanically anchor to substrate through termination bars.

3.8 FIELD QUALITY CONTROL

- A. Testing Agency: the City of New York will engage a qualified independent testing and inspecting agency to perform roof tests and inspections and to prepare test reports.
- B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Commissioner.
 - 1. Notify Commissioner or The City of New York 7 days in advance of date and time of inspection.
- C. Repair or remove and replace components of membrane roofing systems where test results or inspections indicate that they do not comply with specified requirements.
- D. Additional testing and inspecting, at the Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.9 PROTECTING AND CLEANING

- A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies for Commissioner and City of New York.
 - 1. Notify Commissioner and City of New York 48 hours in advance of the date and time of inspection.
- B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates, and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 076200

SHEET METAL FLASHING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the sheet metal flashing, as indicated on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Stainless steel through wall flashing.
 - 2. Field fabricating (including bending, cutting, soldering, etc.), if required, of stainless steel flashing.
 - 3. Stainless steel flashing elsewhere, where metal flashing is indicated on drawings.
 - 4. Separation of contacting surfaces of dissimilar metals.

1.3 RELATED SECTIONS

- A. Construction Waste Management and Disposal - Section 017419
- B. Sustainable Design Requirements (LEED Building) - Section 018113
- C. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3
- D. Construction IAQ Requirements - Section 018119

- B. Unit masonry- Section 042000.
- C. Masonry Restoration and Cleaning- Section 049000
- D. Waterproofing - Section 071900
- E. Building Insulation – Section 072100
- F. Thermoplastic Membrane Roofing - Section 075400
- G. Sheet Metal Work – Section 076200
- H. Firestops and Sealers – Section 078400
- I. Aluminum Framed Entrances and Storefront – Section 084113
- J. Aluminum Windows and Doors – Section 085113
- K. Work in associated Divisions 21-23, 26-28

1.4 SUBMITTALS

- A. Shop Drawings: Submit, showing all materials, finishes, fastenings, joint details, fabrication, construction and relation to adjoining construction.
- B. Samples: Submit 12" x 12" samples of flashing materials and finishes.
- C. LEED BUILDING Submittal Requirements:
The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 - 1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s) and the location (source) of the raw materials used to manufacture the product(s)
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
 - 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.

3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

1.5 WARRANTY

- A. The Contractor shall warrant that all Metal Flashing Work executed under this Section will be free from defects in materials and workmanship for a period of two (2) years from date of acceptance of the Project, and he shall remedy any defects in the Metal Flashing Work.

1.6 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation, and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the City of New York.
- C. LEED BUILDING Performance Criteria:
The following criteria are REQUIRED for the products included in this section:
 1. Metal members shall contain a minimum of 35% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Structural steel shall contain 75%. Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.
 2. Metal members fabricated within, and containing raw materials extracted within, 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements above.
 3. Adhesives or sealants used for work in this section shall meet the requirements of Section 018113.3 : Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
 4. Certification of these products shall be in accordance with the LEED BUILDING

Submittal Requirements of this Section.

PART 2 PRODUCTS

2.1 MATERIALS

A. Stainless Steel Flashing Materials

1. Stainless Steel Flashing: ASTM A 167, Type 304, stainless steel, with 2D finish, dead soft temper, fully annealed, as manufactured by International Nickel Co., Republic Steel Corp., United States Steel, or Washington Steel Corp. Thickness of stainless steel shall be as listed below.
 - a. Concealed Flashings: 0.012" thick, thirty (30) gauge (U.S. Standard).
 - b. Exposed Flashings: 0.015" thick, twenty-eight (28) gauge (U.S. Standard).
 - c. Edge Strips: 0.025" thick, twenty-four (24) gauge (U.S. Standard).
 - d. Roof Flashing: 26 gauge, type 304 ASTM A666 stainless steel
2. Through wall flashing shall have sawtooth ribs at three (3) inch interval as manufactured by Keystone Flashing Co., Krando Metal Products Inc, B&B Sheet Metal or approved equal.
3. Accessories and Fastenings: AISI, Types 302 and 304 stainless steel.
4. Solder: Composed of sixty (60) percent block tin and forty (40) percent pig lead, except that solder at seams exposed to public view shall be eighty (80) percent tin and twenty (20) percent lead.
5. Flux: An acid type flux manufactured specifically for soldering stainless steel, as approved.

- B. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type non-corrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where sheet metal work is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 METAL FLASHING INSTALLATION

- A. Reference Standard: Conform to the requirements of 5th Edition of the Sheet Metal and Air Conditioning Contractors Association (SMACNA) Architectural Sheet Metal Manual.

- B. General: Fabricate and install metal flashing work in accordance with details and specifications of above Reference Standard, with manufacturer's instructions, and as herein specified, to provide a watertight installation. Apply metal flashing to smooth, even, sound, clean, dry surfaces free from defects. Make provisions to allow for expansion and contraction of metal flashing work. Wherever practicable, shop form all metal flashing work and deliver ready for installation. Form metal flashing work accurately to required profiles, with flat surfaces, straight edges and corners, free from defects. Fold exposed metal edges back not less than 1/2" and form drip.
- C. Nailing: Confine to sheets twelve (12) inches or less in width. Confine nailing to one edge only, locate nails where concealed. Use No. 12 x 1" long flat headed, annular threaded, Type 302 stainless steel nails for nailing to wood blocking; use one (1) inch long masonry nails for nailing to concrete. Space nails four (4) inches o.c. maximum.
- D. Cleating: Use cleats where sheets are more than twelve (12) inches in width. Space cleats approximately twelve (12) inches o.c. Cleats two (2) inches wide by three (3) inches long, of the same material and weight as the metal flashing being installed. Secure one end of the cleat with two (2) nails and fold edge back over the nail heads. Lock other end into seam or into folded edge of metal flashing sheets. Pre-tin cleats for soldered seams.
- E. Joining: Join metal flashings with one (1) inch locked and soldered seams except at slip joints. Mallet seams flat and solder full length of seam as specified below.
- F. Soldering: Clean and pre-tin edges of metal flashing to be soldered before soldering is begun with solder on both sides for a width of not less than 1-1/2". Solder slowly with well heated metal surfaces. Use ample solder. Show not less than one full inch of evenly flowed solder on seam. Seams shall have a liberal amount of flux brushed in before soldering is commenced. Where soldering paste or killed acid is employed as a flux, soldering shall follow immediately after application of the flux. Upon completion of soldering, clean surfaces of all flux.
- G. Slip Joints: Locate slip joints not more than twenty-four (24) feet apart and not more than eight (8) feet from corners. Form slip joints as three (3) inch wide joints with cover piece behind flashing, and fill locked ends neatly with sealant.
- H. Cap Flashing: Install over base flashings, in eight (8) to ten (10) foot lengths, lapped six (6) inches at ends. Cap flashing shall be increased longitudinally to produce spring action to hold bottom edge of cap flashing firmly against base flashing. Cap flashing shall lap base flashing at least four (4) inches, with exposed bottom edge at a forty-five (45) degree angle downward and folded back on underside at least 1/2" to form drip. Make cap flashing continuous at corners and angles.
- I. Miscellaneous Flashing: Provide all other miscellaneous metal flashing not specifically mentioned herein, but indicated on drawings and/or required to provide a watertight installation.
- J. Separation of Dissimilar Materials: Back paint surfaces of metal flashing in contact with dissimilar metals or with concrete or masonry with bituminous paint.

K. Reglets

1. Provide watertight reglets in masonry and concrete work to receive cap flashing. Form reglets of stainless steel using same thickness as stainless steel sheet metal specified.
2. In masonry work use open or closed slot reglets with slot at least one (1) inch deep and 3/16" wide. Provide hook dams or turn-ups for anchoring securely into mortar joints. Insert cap flashing into slot full depth using button punch or lead wedges to lock in place.
3. In concrete work, use open or closed slot reglets with slot sloped upward at forty-five (45) degrees, at least one (1) inch deep and 3/16" wide. For fastening reglets to concrete forms use double-head stainless steel nails spaced twelve (12) inches apart maximum.
4. Insert cap flashing full depth into reglet slot, and wedge in place using lead strips spaced on twelve (12) inch centers maximum or lead caulking rope. When lead strips are used for continuous caulked reglets, use approved weather-resistant fibrous compounds.

- L. Through-the-Wall Flashings: Provide through-the-wall flashings as shown. Form bonding features so as not to puddle water on surface. Lap cross joints to interlock design pattern at least three (3) inches. Stop typical flashings in mortar joint 1/2" from exterior face of wall.

END OF SECTION

SECTION 076500

FLEXIBLE FLASHING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

A LEED BUILDING - GENERAL REQUIREMENTS:

The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the flexible flashing, as indicated on the drawings and/or specified herein, including, but not limited to, the following:

1. Flexible flashing within exterior wall construction.
2. Setting cements, joint sealers and primers.

1.3 RELATED SECTIONS

- A. Construction waste management and disposal - section 017419
- B. Construction waste management and disposal - section 017419
- C. Sustainable design requirements (LEED building) - section 018113
- D. Volatile organic compound (voc) limits for adhesives, sealants, paints and coatings - Section 018113.3
- E. Construction IAQ requirements - Section 018119
- F. Cast-In-Place Concrete - Section 033000.

- G. Unit Masonry- Section 042000.
- H. Masonry Restoration and Cleaning - Section 049000
- I. Miscellaneous Metals – Section 055000.
- J. Waterproofing - Section 071900
- K. Building Insulation – Section 072100
- L. Sheet Metal Flashing – Section 076200
- M. Firestops and Smoke seals – Section 078400
- N. Aluminum Framed Entrances and Storefront – Section 084113
- O. Aluminum Windows and Doors– Section 085113
- P. Work in associated Divisions 21-23, 26-28

1.4 SUBMITTALS

- A. Submit product data and 6" x 6" samples of material described herein.

B. LEED BUILDING Submittal Requirements:

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications.
2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the LEED Consultant for review.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the site, ready to use in the manufacturer's original and unopened containers and packaging, bearing labels as to type of material, brand name and manufacturer's name. Delivered material shall be identical to reviewed samples.
- B. Store materials under cover in a dry and clean location, off the ground. Remove materials which are damaged, torn, stained or otherwise not suitable for installation from the job site and replace with acceptable materials.
- C. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.6 GUARANTEE

- A. Guarantee fabric flashing against defects of materials and workmanship for a period of two (2) years from the date of substantial completion with warranty for a period of five (5) years from the manufacturer in a form acceptable to the Commissioner, and duly executed by authorized principals of the Contractor and/or the manufacturer of the installed materials.

PART 2 PRODUCTS

2.1 FLEXIBLE FLASHING

- A. Provide 32 mils of self-adhesive rubberized asphalt integrally bonded to 8 mils of cross-laminated, high-density polyethylene fiber to provide a 40 mil thick membrane equal to "Perm-A-Barrier" (basis of design) manufactured by W. R. Grace, "Blueskin S/A" by Henry, "Textroflash" by Hohmann and Barnard or approved equal.
- B. Stainless Steel Drip Edge: ASTM A 666, Type 304, 26 gauge stainless steel with 2D finish.
- C. Provide all primers, surface conditions and mastics to provide complete installation.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine surfaces to which the work is to be attached or applied and correct any conditions which are detrimental to the proper and expeditious installation of the work. Starting of work shall imply acceptance of surfaces to perform work as specified.
- B. Verify dimension taken at the job site affecting the work. Bring field dimensions which are at variance to the attention of the Commissioner. Obtain decision regarding corrective measures before the start of installation.

3.2 PREPARATION

- A. Prepare the surfaces to which fabric flashing is to be applied so that they are smooth, clean and dry, and free from laitance, dirt, dust, grease, loose particles and other materials that may affect the bond, efficiency or performance of the work. Remove projections that might puncture the flashing and fill large voids or cavities.

3.3 INSTALLATION

- A. Use only associated products and systems by the same manufacturer and/or stated by the manufacturer as recommended and compatible for the application.
- B. Perm-A-Barrier Wall Flashing and accessories are not designed for use as a finished surface or for use in areas where they will be exposed to sunlight. Perm-A-Barrier Wall Flashing is compatible with fully-cured coat tar product, but is incompatible with creosote and sealant products containing polysulfide polymers.
- C. Perm-a-Barrier Wall Flashing and Perm-a-Barrier Surface Conditioner can only be applied in air and surface temperatures of 25 F and above.
- D. After precipitation, allow a minimum of 24 hours for drying before installing the flashing.
- E. Remove all deleterious materials from surfaces to be flashed.
- F. Perm-a-Barrier Surface Conditioner is required for dirty or dusty surfaces or surfaces having irregular or rough textures.
- G. When required, apply Perm-A-Barrier Surface Conditioner by spray, brush or roller at the rate recommended by W. R. Grace & Co. Solvent-based adhesives or primers are not recommended as substitutes for Perm-a-Barrier Surface Conditioner.
- H. Allow Perm-A-Barrier Surface Conditioner to dry completely before flashing application. The surface conditioning is considered dry when the substrate returns to its original color (minimum 1 hour). To test for dryness, rub small conditioned area by hand. Wet conditioner will ball up under the fingertips. Let dry until conditioner cannot be rubbed off.

- I. If conditioned areas are not covered that day, recondition area if there is significant dust or dirt contamination.
 - J. Precut pieces of Perm-a-Barrier Wall Flashing to easily handle lengths for each location.
 - K. Remove silicone-coated release paper and position flashing carefully before placing it against the surface.
 - L. When properly positioned, place against surface by pressing firmly into place by hand roller or a blunt object, such as the back of utility knife. Fully adhere flashing to substrate to prevent water from migrating under the flashing.
 - M. Overlap adjacent pieces 2 inches and roll all overlaps with a steel hand roller or blunt object.
 - N. Trim bottom edge 1/2 inch back from exposed face of building.
 - O. At heads, sill and other horizontal terminations of flashing, turn up ends a minimum of 2 inches, cut and make careful folds to form a pan and seal with Bituthene Mastic per Grace Detail Drawings.
 - P. Apply a bead or trowel coat of Bituthene Mastic along top edges, seams, cuts and penetrations.
 - Q. Seal all penetrations through flashing with Bituthene Mastic.
- 3.4 PROTECTION
- A. Protect installed work from damage. Repair damages due to subsequent work of other trades to the satisfaction of the Commissioner, at no additional cost to the City of New York.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 077200

ROOF SPECIALTIES AND ACCESSORIES

PART 1.00 - GENERAL

1.01 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. **LEED BUILDING - GENERAL REQUIREMENTS:**
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.02 WORK INCLUDED

- A. The Work of this Section includes all labor, materials, equipment and services necessary to complete the roof specialties and accessories as shown on the drawings and specified herein, including but is not necessarily limited to the following:
 - 1. Aluminum gutter and downspouts.

1.03 RELATED WORK

- 1. Construction Waste Management And Disposal - Section 017419
- 2. Sustainable Design Requirements (LEED Building) - Section 018113
- 3. Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints And Coatings - Section 018113.3
- 4. Construction IAQ Requirements – Section 018119
- 5. Waterproofing - Section 071900
- 6. Building Insulation – Section 072100
- 7. Exterior Insulation and Finish Systems (EIFS)- 072400
- 8. Thermoplastic Membrane Roofing - Section 075400
- 9. Sheet Metal Work – Section 076200

- 10. Firestops and Sealers – Section 078400
- 11. Work in associated Divisions 21-23, 26-28

1.04 SUBMITTALS

- A. Before any roof specialties and accessories are delivered to the job site, submit shop drawings showing profiles and anchoring devices.
- B. LEED BUILDING Submittal Requirements:
The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 - 1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications.
 - 2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
 - 3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION
 - 4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
 - 5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the LEED Consultant for review.

1.05 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during and after installation and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

PART 2.00 - PRODUCTS

2.01 ALUMINUM GUTTERS AND DOWNSPOUTS

- A. Provide gutters and downspouts in shapes and sizes indicated, with mitered and welded corners. Include steel straps formed from at least 0.028-inch thick, galvanized steel sheet; hangers or other attachment devices; screens; end plates; and trim and other accessories indicated or required for complete installation.
 - 1. Leaf guard with hold-down clips.
- B. Provide gutters and downspouts fabricated from the following metal:
 - 1. Formed-aluminum sheet in thickness indicated, but not less than the following:
 - a. Thickness: 0.032 inch.

PART 3.00 - EXECUTION

3.01 INSPECTION

- A. Examine the areas and conditions where roof specialties and accessories are to be installed and notify the Commissioner of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.02 INSTALLATION

- A. General: Comply with manufacturer's instructions and recommendations. Coordinate with installation of roof deck and other substrates to receive accessory units, and with roof insulation, roofing and flashing; as required to ensure that each element of the work performs properly, and that combined elements are waterproof and weathertight. Anchor units securely to supporting structural substrates, adequate to withstand lateral and thermal stresses as well as inward and outward loading pressures.
- B. Isolation: Where metal surfaces of units are to be installed in contact with noncompatible metal or corrosive substrates, including wood, apply bituminous coating on concealed metal surfaces, or provide other permanent separation.
- C. Cap Flashing: Where cap flashing is required as component of accessory, install to provide adequate waterproof overlap with roofing or roof flashing (as counter flashing). Seal with thick bead of mastic sealant, except where overlap is indicated to be left open for ventilation.

3.03 CLEANING AND PROTECTION

- A. Clean exposed metal and plastic surfaces in accordance with manufacturer's instructions. Touch up damaged metal coatings.

END OF SECTION

THIS PAGE LEFT INTENTIONALLY BLANK

SECTION 078400

FIRESTOPS AND SMOKESEALS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the firestops and smoke seals for all trades as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Penetrations through fire-resistance-rated floor and roof construction including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.
 - 2. Penetrations through fire-resistance-rated walls and partitions including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.
 - 3. Penetrations through smoke barriers and construction enclosing compartmentalized areas involving both empty openings and openings containing penetrating items.
 - 4. Sealant joints in fire-resistance-rated construction.
 - 5. Penetrations at each floor level in shafts and/or stairwells.
 - 6. Construction joints, including those between top of fire rated walls and underside of floors above.

1.3 RELATED SECTIONS

1. Construction Waste Management and Disposal - Section 017419
2. Sustainable Design Requirements (LEED Building) – Section 018113
3. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3
4. Construction IAQ Requirements - Section 018119
5. Cast-in-place concrete - Section 033000.
6. Unit masonry- Section 042000.
7. Masonry Restoration and Cleaning - Section 049000
8. Waterproofing - Section 071900
9. Building Insulation – Section 072100
10. Thermoplastic Membrane Roofing - Section 075400
11. Sheet Metal Work – Section 076200
12. Aluminum Framed Entrances and Storefront – Section 084113
13. Aluminum Windows and Doors – Section 085113
14. Glass and Glazing – Section 088000
15. Gypsum Drywall – Section 092500
16. Stone and Tile – Section 093100
17. Work in associated Divisions 21-23, 26-28

1.4 REFERENCES

- A. ASTM E 814 "Standard Method of Fire Tests of Through-Penetration Firestops."
- B. UL 1479, UBC 7-5 (Both are same as A. above).
- C. ASTM E 119 "Standard Method of Fire Tests of Building Construction and Materials."

- D. UL 263, UBC 7-1 (Both are same as C. above).
- E. UL 2079 "Tests For Fire Resistance of Building Joint Systems."
- F. ASTM E 1399 "Test For Dynamic Movement Conditions."
- G. ASTM E 1966 (Same as E. above).
- H. Published Through-Penetration Systems by recognized independent testing agencies.
 - 1. UL Fire Resistance Directory, Volume II of current year.
 - 2. Warnock Hersey Certification Listings, current year.
 - 3. Omega Point Laboratories, current year.
- I. Material must have BSA and/or MEA approval for use in New York City.

1.5 SUBMITTALS

- A. Submit manufacturer's product literature for each type of firestop material to be installed. Literature shall indicate product characteristics, typical uses, performance, limitation criteria, test data and indication that products comply with specified requirements.
- B. Submit shop drawings detailing materials, installation methods, and relationships to adjoining construction for each firestop system, and each kind of construction condition penetrated and kind of penetrating item. Include firestop design designation of qualified testing and inspection agency evidencing compliance with requirements for each condition indicated.
 - 1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop configuration for construction and penetrating items.
- C. Material Safety Data Sheets: Submit MSDS for each firestop product.
- D. Submit qualifications of firestop installer, including letter from firestop manufacturer of products proposed to be installed, wherein manufacturer approves or recognizes as trained/ or certifies installer for installation of that manufacturer's products.
- E. Manufacturer's Letters: For installations or configurations not covered by a UL or Warnock Hersey design number, a recommendation shall be obtained from the manufacturer, in writing, for the specific application.
- F. LEED BUILDING Submittal Requirements
The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 - 1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION

FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications. Information to be supplied includes:

- a. The amount of recycled content in the product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
 3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
 4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

1.6 QUALITY ASSURANCE

- A. General: Provide firestopping systems that are produced and installed to resist the spread of fire, and the passage of smoke and other gases.
- B. Firestopping materials shall conform to Flame (F) and Temperature (T) ratings as required by local building code and as tested by nationally accepted test agencies per ASTM E 814 or UL 1479. The F rating must be a minimum of one (1) hour but not less than the fire resistance rating of the assembly being penetrated. T rating, when required by code authority, shall be based on measurement of the temperature rise on the penetrating item(s). The fire test shall be conducted with a minimum positive pressure differential of 0.01 inches of water column.
- C. Firestopping products shall be asbestos free and free of any PCBs.
- D. Do not use any product containing solvents or that requires hazardous waste disposal.
- E. Do not use firestop products which after curing, dissolve in water.
- F. Do not use firestop products that contain ceramic fibers.

- G. Firestopping Installer Qualifications: Firestop application shall be performed by a single firestopping contractor who specializes in the installation of firestop systems, whose personnel to be utilized have received specific training and certification or approval from the proposed respective firestop manufacturer, and firestop installer shall have a minimum of three years experience (under present company name) installing firestop systems of the type herein specified.
- H. Mock-Up: Prepare job site mock-ups of each typical Firestop System proposed for use in the project. Approved mock-ups will be left in place as part of the finished project and will constitute the quality standard for the remaining work.
- I. For firestopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.
 - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 - 2. For floor penetrations with annular spaces exceeding 4 inches or more in width and exposed to possible loading and traffic, provide firestop systems capable of supporting the floor loads involved either by installing floor plates or by other means.
 - 3. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
- J. LEED BUILDING Performance Criteria:
The following criteria are REQUIRED for the products included in this section:
 - 1. Materials in this section harvested and manufactured within 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements of this Section.
 - 2. Adhesives or sealants used for work in this section shall meet the requirements of Section 018113.3 : Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING)", where applicable. As per Section 018113.3 , sealants used as filler shall not exceed 250 grams per liter.
 - 3. Certification of these products shall be in accordance with the Submittal Requirements of this Section.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original unopened containers with manufacturer's name, product identification, lot numbers, UL or Warnock Hersey labels, and mixing and installation instructions, as applicable.
- B. Store materials in the original, unopened containers or packages, and under conditions recommended by manufacturer.

- C. All firestop materials shall be installed prior to expiration of shelf life.

1.8 PROJECT CONDITIONS

- A. Verify existing conditions and substrates before starting work
- B. Do not use materials that contain solvents, show sign of damage or are beyond their shelf life.
- C. During installation, provide masking and drop cloths as needed to prevent firestopping products from contaminating any adjacent surfaces.
- D. Conform to ventilation requirements if required by manufacturer's installation instructions or Material Safety Data Sheet.
- E. Weather Conditions: Do not proceed with installation of firestop products when temperatures are in excess or below the manufacturer's recommendations.
- F. Schedule installation of firestop products after completion of penetrating item installation but prior to covering or concealing of openings.
- G. Coordinate this work as required with work of other trades.

1.9 SEQUENCING AND SCHEDULING

- A. Pre-Installation Conference: Convene a pre-installation conference to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.
- B. Sequence: Perform work of this and other sections in proper sequence to prevent damage to the firestop systems and to ensure that their installation will occur prior to enclosing or concealing work.
- C. Install all firestop systems after voids and joints are prepared sufficiently to accept the applicable firestop system.
- D. Do not cover firestop systems until they have been properly inspected and accepted by the authority having jurisdiction.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with requirements, provide products of one of the following manufacturers:
 - 1. Tremco
 - 2. Bio-Fireshield
 - 3. 3M

4. Specified Technologies Inc.
5. U.S. Gypsum Co.
6. Nelson
7. Hilti, Inc.
8. Grace Flame Safe

2.2 FIRESTOPPING, GENERAL

- A. Compatibility: Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by firestopping manufacturer based on testing and field experience.
- B. Accessories: Provide components for each firestopping system that are needed to install fill materials. Use only components specified by the firestopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire-resistance-rated systems. Accessories include but are not limited to the following items:
 1. Permanent forming/damming/backing materials including the following:
 - a. Semirefractory fiber (mineral wool) insulation.
 - b. Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state.
 - c. Fire-rated form board.
 - d. Joint fillers for joint sealants.
 2. Temporary forming materials.
 3. Substrate primers.
 4. Collars.
 5. Steel sleeves.
- C. Applications: Provide firestopping systems composed of materials specified in this Section that comply with system performance and other requirements.
- D. Smoke seals at top of partitions shall be flexible to allow for partition deflection.

2.3 FILL MATERIALS FOR THROUGH-PENETRATION FIRESTOP SYSTEMS

- A. Endothermic, Latex Compound Sealant: Single-component, endothermic, latex formulation.
- B. Intumescent, Latex Sealant: Single-component, Intumescent, latex formulation.

- C. Intumescent Putty: Non-hardening, dielectric, water-resistant putty containing no solvents, inorganic fibers, or silicone compounds.
- D. Intumescent Wrap Strips: Single-component, elastomeric sheet with aluminum or polyethylene foil on one side.
- E. Job-Mixed Vinyl Compound: Prepackaged vinyl-based powder product for mixing with water at Project site to produce a paintable compound, passing ASTM E 136, with flame-spread and smoke-developed ratings of zero per ASTM E 84.
- F. Mortar: Prepackaged dry mix composed of a blend of inorganic binders, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a non-shrinking, homogeneous mortar.
- G. Pillows/Bags: Re-usable, heat-expanding pillows/bags composed of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives.
- H. Silicone Foam: Two-component, silicone-based liquid elastomer that, when mixed, expands and cures in place to produce a flexible, non-shrinking foam.
- I. Silicone Sealant: Moisture-curing, single-component, silicone-based, neutral-curing elastomeric sealant of grade indicated below:
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces and non-sag formulation for openings in vertical and other surfaces requiring a non-slumping/gunnable sealant, unless firestop system limits use to non-sag grade for both opening conditions.

2.4 FIRE-RESISTIVE ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated that complies with ASTM C 920 requirements, including those referenced for Type, Grade, Class, and Uses, and requirements specified in this Section applicable to fire-resistive joint sealants.
 - 1. Sealant Colors: Color of exposed joint sealants as selected by the Commissioner.
- B. Single-Component, Neutral-Curing Silicone Sealant: Type S; Grade NS; Class 25; exposure-related Use NT, and joint-substrate-related Uses M, G, A, and (as applicable to joint substrates indicated) O.
 - 1. Additional Movement Capability: Provide sealant with the capability to withstand 33 percent movement in both extension and compression for a total of 66 percent movement.
- C. Multi-Component, Non-Sag, Urethane Sealant: Type M; Grade NS; Class 25; exposure-related Use NT, and joint-substrate-related Uses M, A, and (as applicable to joint substrates indicated) O.

1. Additional Movement Capability: Provide sealant with the capability to withstand 40 percent movement in extension and 25 percent in compression for a total of 65 percent movement in joint width existing at time of installation, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, and remain in compliance with other requirements of ASTM C 920 for uses indicated.
 - D. Single-Component, Non-Sag, Urethane Sealant: Type S; Grade NS; Class 25; and Uses NT, M, A, and (as applicable to joint substrates indicated) O.
- 2.5 MINERAL FIBER/CERAMIC WOOL NON-COMBUSTIBLE INSULATION (FIRE SAFING)
- A. Provide min. 4 pcf Thermafiber as manufactured by Thermafiber Co., min. 4 pcf FBX Safing Insulation as manufactured by Fibrex, or approved equal to suit conditions and to comply with fire resistance and firestop manufacturer's requirements.
 - B. Material shall be classified non-combustible per ASTM E 119.
- 2.6 MIXING
- A. For those products requiring mixing prior to application, comply with firestopping manufacturer's directions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce firestopping products of uniform quality with optimum performance characteristics for application indicated.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions with Installer present, for compliance with requirements for opening configuration, penetrating items, substrates, and other conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings and joints immediately prior to installing firestopping to comply with recommendations of firestopping manufacturer and the following requirements:
 1. Remove all foreign materials from surfaces of opening and joint substrates and from penetrating items that could interfere with adhesion of firestopping.
 2. Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with firestopping. Remove loose particles remaining from cleaning operation.
 3. Remove laitance and form release agents from concrete.

- B. Priming: Prime substrates where recommended by firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent firestopping from contacting adjoining surfaces that will remain exposed upon completion of work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestopping materials. Remove tape as soon as it is possible to do so without disturbing seal of firestopping with substrates.

3.3 CONDITIONS REQUIRING FIRESTOPPING

A. Interior Walls and Partitions

1. Construction joints between top of fire rated walls and underside of floors above, shall be firestopped.
2. Firestop system installed shall have been tested by either UL or Omega Point, including exposure to hose stream test and including for use with steel fluted deck floor assemblies.
3. Firestop system used shall allow for deflection of floor above.

B. Penetrations

1. Penetrations include conduit, cable, wire, pipe, duct, or other elements which pass through one or both outer surfaces of a fire rated floor, wall, or partition.
2. Except for floors on grade, where a penetration occurs through a structural floor or roof and a space would otherwise remain open between the surfaces of the penetration and the edge of the adjoining structural floor or roof, provide firestopping to fill such spaces in accordance with ASTM E 814.
3. These requirements for penetrations shall apply whether or not sleeves have been provided, and whether or not penetrations are to be equipped with escutcheons or other trim. If penetrations are sleeved, firestop annular space, if any, between sleeve and wall of opening.

- C. Provide firestopping to fill miscellaneous voids and openings in fire rated construction in a manner essentially the same as specified herein before.

3.4 INSTALLING THROUGH PENETRATION FIRESTOPS

- A. General: Comply with the through penetrations firestop manufacturer's installation instructions and drawings pertaining to products and applications indicated.
- B. Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross sectional shapes and depths required to achieve fire ratings of designated through-penetration firestop systems. After installing fill materials, remove combustible

forming materials and other accessories not indicated as permanent components of firestop systems.

- C. Install fill materials for through penetration firestop systems by proven techniques to produce the following results:
 - 1. Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.
 - 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 work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.5 INSTALLING FIRE RESISTIVE JOINT SEALANTS

- A. General: Comply with ASTM C 1193, and with the sealant manufacturer's installation instructions and drawings pertaining to products and applications indicated.
- B. Install joint fillers to provide support of sealants during application and at position required to produce the cross sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability and develop fire resistance rating required.
- C. Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross sectional shapes and depths relative to joint width that optimum sealant movement capability. Install sealants at the same time joint fillers are installed.
- D. Tool no sag sealants immediately after sealant application and prior to the time skinning or curing begins. Form smooth, uniform beads of configuration indicated or required to produce fire resistance rating, as well as to eliminate air pockets, and to ensure contact and adhesion of sealants with sides of joint. Remove excess sealant from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

3.6 INSTALLING FIRESAFING INSULATION

- A. Install fire safing insulation utilizing welded or screw applied galvanized steel impaling pins and retaining clips; space clips or pins 24" o.c. maximum.
- B. Completely fill voids in areas where safing insulation is required. At spandrel conditions/floor edges, depth of insulation top to bottom shall be at least four (4) inches.
- C. Cover top of all safing insulation with firestop sealant or spray.

3.7 FIELD QUALITY CONTROL

- A. Inspecting agency employed and paid by The City of New York will examine completed firestopping to determine, in general, if it is being installed in compliance with requirements.
- B. Inspecting agency will report observations promptly and in writing to Contractor, The City of New York and Commissioner.
- C. Do not proceed to enclose firestopping with other construction until reports of examinations are issued.
- D. Where deficiencies are found, Contractor must repair or replace firestopping so that it complies with requirements.

3.8 CLEANING

- A. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which opening and joints occur.
- B. Protect firestopping during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they 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 firestopping immediately and install new materials to product firestopping complying with specified requirements.

END OF SECTION

SECTION 079200

JOINT SEALERS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SECTION INCLUDES

- A. The Work of this Section includes all labor, materials, equipment and services necessary to complete the joint sealers work as shown on the drawings and/or specified herein, including but not necessarily limited to the following:
 - 1. Flashing reglets and retainers.
 - 2. Exterior wall joints not specified to be sealed in other Sections of work.
 - a. Crack Repair Sealant – see drawing S201 North Elevation
 - 3. Interior wall joints not specified to be sealed in other Sections of work, including caulking to fill between architectural woodwork and any wall, floor and/or ceiling imperfections.
 - 4. Control and expansion joints in walls.
 - 5. Joints at wall penetrations.
 - 6. Joints between items of equipment and other construction.
 - 7. All other joints required to be sealed to provide a positive barrier against penetration of air and moisture.

1.3 RELATED SECTIONS

1. Construction waste management and disposal - section 017419
2. Sustainable design requirements (LEED building) - section 018113
3. Volatile organic compound (voc) limits for adhesives, sealants, paints and coatings - Section 018113.3
4. Construction IAQ requirements - Section 018119
5. Cast-in-place concrete - Section 033000.
6. Unit masonry- Section 042000.
7. Masonry restoration and cleaning - Section 049000
8. Waterproofing - Section 071900
9. Building insulation – Section 072100
10. Thermoplastic membrane roofing - Section 075400
11. Sheet metal work – Section 076200
12. Firestops and sealers – Section 078400
13. Hollow metal doors – Section 081100
14. Aluminum windows – Section 085113
15. Glass and glazing – Section 088000
16. Gypsum drywall – Section 092500
17. Stone and tile – Section 093100
18. Work in associated divisions 21-23, 26-28

1.4 QUALITY ASSURANCE

- A. Qualification of Installers: Use only personnel who are thoroughly familiar, skilled and specially trained in the techniques of sealant work, and who are completely familiar with the published recommendations of the sealant manufacturer.
- B. LEED BUILDING Performance Criteria:
The following criteria are REQUIRED for the products included in this section:
 1. Materials in this section harvested and manufactured within 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements of this Section.

2. Adhesives or sealants used for work in this section shall meet the requirements of Section 018113.3 : Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING)", where applicable. As per Section 018113.3 , sealants used as filler shall not exceed 250 grams per liter.
3. Certification of these products shall be in accordance with the Submittal Requirements of this Section.

1.5 SUBMITTALS

- A. Shop Drawings: Submit shop drawings showing all joint conditions, indicating relation of adjacent materials, all sealant materials (sealant, bond breakers, backing, primers, etc.), and method of installation.
 1. Submit joint sizing calculations certifying that movement capability of sealant is not being exceeded.
- B. Samples: Submit the following:
 1. Color samples of sealants.
 2. Sealant bond breaker and joint backing.
- C. Product Data: Submit manufacturer's technical information and installation instructions for:
 1. Sealant materials, indicating that material meets standards specified herein.
 2. Backing rods.
- D. LEED BUILDING Submittal Requirements
The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.

2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

1.6 ENVIRONMENTAL CONDITIONS

- A. Temperature: Install all work of this Section when air temperature is above forty (40) degrees F. and below eighty (80) degrees F., unless manufacturer submits written instructions permitting sealant use outside of this temperature range.
- B. Moisture: Do not apply work of this Section on surfaces which are wet, damp, or have frost.

1.7 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section, before, during and after installation and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary.
- C. Storage
 1. Store sealant materials and equipment under conditions recommended by their manufacturer.
 2. Do not use materials stored for a period of time exceeding the maximum recommended shelf life of the material.

1.8 WARRANTY

- A. Provide a written, notarized warranty from the manufacturer and the applicator stating that the applied sealants shall remain watertight for a period of two (2) years.

- B. Include in warranty provision, agreement to repair and/or replace, sealant defects which develop during guarantee period, because of faulty labor and/or materials.

PART 2 PRODUCTS

2.1 SEALANT MATERIALS

- A. Exterior Wall Sealant: Provide one (1) part non-sag sealant equal to No. 790 or 795 made by Dow Corning, "Silpruf SCS 2000" or "LM SCS 2700" made by G.E. or "Spectrem 1" or "Spectrem 3" made by Tremco or "Sonolastic 150" by Sonneborn conforming to the minimum standards of ASTM C 920, Type S, Grade NS, Class 50.
- B. Exterior Crack Repair Sealant – Provide one (1) low modulus, high performance, one (1) component, polyurethane-based, non-sag elastomeric sealant meeting Federal Specification TT-S-00230C, Type II, Class A, ASTM C-920, Type S, Grade NS, Class 100/50; Federal Specification for silicones –TT-S-001543 A Type non-sag. Sealant to have +100%/-50% joint movement capability, temperature service range of -40°F to 170°F, recovery of >80%, a tensile stress of 125psi minimum and excellent weather resistance.
- C. Interior Sealant: Provide a one (1) part acrylic based sealant conforming to ASTM C 834, equal to "AC-20+ Silicone" made by Pecora or equal made by Tremco.
- D. Colors: Custom colors of sealants as selected by the Commissioner.

2.2 MISCELLANEOUS MATERIALS

- A. Back-Up Materials: Provide back-up materials and preformed joint fillers, non-staining, non-absorbent, compatible with sealant and primer, and of a resilient nature, equal to "Sof-Rod" made by Nomaco Inc. or approved equal, twenty-five (25) percent wider than joint width. Materials impregnated with oil, bitumen or similar materials shall not be used. Provide back-up materials only as recommended by sealant manufacturer in writing.
- B. Provide bond breakers, where required, of polyethylene tape as recommended by manufacturer of sealant.
- C. Provide primers recommended by the sealant manufacturer for each material to receive sealant. Note that each exterior joint must be primed prior to sealing.
- D. Provide solvent, cleaning agents and other accessory materials as recommended by the sealant manufacturer.
- E. Materials shall be delivered to the job in sealed containers with manufacturer's original labels attached. Materials shall be used per manufacturer's printed instructions.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where joint sealers are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications and conditions required by this Project where more stringent installation requirements are specified herein, such requirements shall apply.
- B. Apply sealant under pressure with a hand or power actuated gun or other appropriate means. Gun shall have nozzle of proper size and provide sufficient pressure to completely fill joints as detailed. Neatly point or tool joint to provide the contour as indicated on the drawings.
- C. Preparation and Application
 - 1. Thoroughly clean all joints, removing all foreign matter such as dust, oil, grease, water, surface dirt and frost. Sealant must be applied to the base surface. Previously applied film must be entirely removed.
 - 2. Stone, masonry and concrete surfaces to receive sealant shall be cleaned where necessary by grinding, water blast cleaning, mechanical abrading, or combination of these methods as required to provide a clean, sound base surface for sealant adhesion.
 - a. Do not use any acid or other material which might stain surfaces.
 - b. Remove laitance by grinding or mechanical abrading.
 - c. Remove loose particles present or resulting from grinding, abrading, or blast cleaning by blowing out joints with compressed air, oil and water free, or vacuuming joints prior to application of primer or sealant.
 - 3. Clean non-porous surfaces such as metal and glass chemically. Remove protective coatings on metallic surfaces by solvent that leaves no residue and is compatible with sealant. Use solvent with clean, lint free paper towels, and wipe dry with clean, dry lint free paper towels. Do not allow solvent to air dry without wiping. Clean joint areas protected with masking tape or strippable films as above after removal of tape film.
 - 4. Do not seal joints until they are in compliance with drawings, or meet with the control section standard.

5. Joint Size and Sealant Size: Joints to receive sealant shall be at least 1/4" wide. In joint 1/4" to 3/8" wide, sealant shall be 1/4" deep. In joints wider than 3/8" and up to 1" wide, sealant depth shall be one half the joint width. For joints wider than 1", sealant depth shall be as recommended by the sealant manufacturer. Depth of joint is defined as distance from outside face of joint to closest point of the filler.
6. Primer: Thoroughly clean joints and apply primer to all surfaces that will receive sealant. Apply primer on clean, dry surfaces, and prior to installation of joint backing. Completely wet both inner faces of the joint with primer. Mask adjacent surfaces of joint with non-staining masking tape prior to priming.
7. Joint Backing: In joints where depth of joint exceeds required depth of sealant, install joint backing (after primer is dry) in joints to provide backing and proper joint shape for sealant. Proper shape for sealant is a very slight "hourglass" shape, with back and front face having slight concave curvature. Use special blunt T-shaped tool or roller to install joint backing to the proper and uniform depth required for the sealant. Joint backing shall be installed with approximately twenty-five (25) percent compressions. Do not stretch, twist, braid, puncture, or tear joint backing. Butt joint backing at intersections.
8. Bond Breaker: Install bond breaker smoothly over joint backing so that sealant adheres only to the sides of the joint and not backing.
9. Sealant Application: Apply sealant in accordance with the manufacturer's application manual and manufacturer's instructions, using hand guns or pressure equipment, on clean, dry, properly prepared substrates, completely filling joints to eliminate air pockets and voids. Mask adjacent surfaces of joint with non-staining masking tape. Force sealant into joint in front of the tip of the "caulking gun" (not pulled after it) and force sealant against sides to make uniform contact with sides of joint and to prevent entrapped air or pulling of sealant off of sides. Fill sealant space solid with sealant.
10. Tooling: Tool exposed joints to form smooth and uniform beds, with slightly concave surface conforming to joint configuration per Figure 5A in ASTM C 1193. Finished joints shall be straight, uniform, smooth and neatly finished. Remove masking tape immediately after tooling of sealant and before sealant face starts to "skin" over. Neatly remove any excess sealant from adjacent surfaces of joint, leaving the work in a neat, clean condition.
11. Replace sealant which is damaged during construction process.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 081113

HOLLOW METAL DOORS AND FRAMES

PART 1 – GENERAL

1.01 SUMMARY

A. SECTION INCLUDES

1. Work under this section comprises of furnishing hollow metal doors and frames, including transom frames, sidelight and window frames with provision for glazed, paneled or louvered openings, fire labeled and non-labeled, as scheduled.

B. RELATED DOCUMENTS

1. Related documents, drawings and general provisions of contract, including General and Supplementary Conditions and Division 1 specification sections apply to this section.
2. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

C. RELATED SECTIONS

1. Construction Waste Management and Disposal - Section 017419
2. Sustainable Design Requirements (LEED Building) - Section 018113
3. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3
4. Construction IAQ Requirements - Section 018119
5. Rough Carpentry – Section 061000
6. Flush Wood Doors - Section 081416
7. Finish Hardware - Section 087100
8. Glass and Glazing - Section 088000

- 9. Gypsum Drywall – Section 092500
- 10. Stone and Tile – Section 093100
- 11. Painting & Finishing - Section 099000
- 12. Divisions 26-28

1.02 REFERENCES

A. STANDARDS

- 1. NFPA-80 – Fire Doors and Windows
- 2. ANSI/SDI-A250.8 – Recommended Specifications for Standard Steel Doors and Frames
- 3. SDI-105-91 – Recommended Erection Instructions for Steel Frames
- 4. SDI-107-78 – Hardware on Steel Doors (reinforcement application)
- 5. ANSI-A250.4 – Steel Doors and Frames Physical Endurance

B. CODES

- 1. NFPA-101-1994 – Life Safety Code
- 2. UBC 1997 - Uniform Building Code
- 3. IBC 2000 – International Building Code
- 4. ANSI-A117.1 – Accessible and Usable Building and Facilities
- 5. ADA – Americans with Disabilities Act

1.03 SUBMITTALS

A. GENERAL REQUIREMENTS

- 1. Submit copies of the hollow metal door and frame shop drawings in accordance with Division 1, General Requirements.

B. PRODUCT DATA

- 1. Submit shop drawings showing fabrication and installation of standard steel doors and frames. Include details of each frame type, elevations of door and frame types, conditions at openings, details of construction, location and installation requirements of door and frame hardware reinforcements, and details of joints and connections. Show anchorage and accessory items.

C. SHOP DRAWINGS

- 1. Provide a schedule of doors and frames using same reference numbers for details and door openings as those on the contract documents. Shop drawings should include the following information:
 - a. Material thickness and/or gauge.

- b. Door core material.
- c. Mortises and reinforcements.
- d. Anchorage types.
- e. Locations of exposed fasteners.
- f. Glazed, louvered and paneled openings.
- g. Mounting locations of standard hardware.

D. LEED BUILDING Submittal Requirements:

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s) and the location (source) of the raw materials used to manufacture the product(s)
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

1.04 QUALITY ASSURANCE

A. SUBSTITUTIONS

1. All substitution requests must be submitted within the procedures and time frame as outlined in General Conditions. Approval of products is at the discretion of the Commissioner and City of New York.

B. MANUFACTURER QUALIFICATIONS

1. Manufacturer shall be a member in good standing of the Steel Door Institute (SDI.)

C. FIRE RATED DOOR ASSEMBLIES

1. All labeled fire door assemblies to be of a type that have been classified and listed in accordance with the latest edition of NFPA80 and test in compliance with NFPA-252, UL-10B, and UBC-7-2. A physical label is to be affixed to the fire door at an authorized facility; embossed labels are acceptable on standard 3 sided door frames.
2. For openings required to be fire rated exceeding limitations of labeled assemblies, submit manufacturer's certification that each door and frame assembly has been constructed to conform to design, materials and construction equivalent to requirements for labeled construction.
3. Project requires door assemblies and components that are compliant with positive pressure and S-label requirements. Specifications must be cross-referenced and coordinated with hardware and other door manufacturers to ensure that total opening engineering is compatible with UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.
 - a. Certification(s) of compliance shall be made available upon request by the Authority Having Jurisdiction.

D. LEED BUILDING Performance Criteria:

The following criteria are REQUIRED for the products included in this section:

1. Metal members shall contain a minimum of 35% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Structural steel shall contain 75%. Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.
2. Metal members fabricated within, and containing raw materials extracted within, 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements above.
3. Adhesives or sealants used for work in this section shall meet the requirements of Section 018113.3 : Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
4. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. The supplier shall deliver all materials to the project site; direct factory shipments are not allowed unless agreed upon beforehand. Supplier shall coordinate delivery times and schedules with the contractor.

- B. Deliver doors cardboard wrapped or crated to provide protection during transit and jobsite storage. Provide additional protection to prevent damage to any factory-finished doors. Mark all doors and frames with opening numbers as shown on the contract documents and shop drawings.
- C. Inspect doors and frames upon delivery for damage. Minor damages may be repaired provided refinished items are equal in all respects to new work and acceptable to the Commissioner. Otherwise, remove and replace damaged goods as directed.
- D. Store doors and frames at the building site in a dry and secure place.
 - 1. Place units on minimum 4" high wood blocking.
 - 2. Avoid use of non-vented plastic or canvas shelters that could create a humidity chamber.
 - 3. If cardboard wrapper on door becomes wet, remove carton immediately.
 - 4. Provide 1/4" spaces between stacked doors to promote air circulation.

1.06 WARRANTY

- A. All doors and frames shall be warranted in writing by the manufacturer against defects in materials and workmanship for a period of one (1) year commencing on the date of final completion and acceptance.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with requirements, provide standard hollow metal doors and frames by a certified SDI manufacturer:
 - 1. Ceco Corporation
 - 2. Curries Company
 - 3. Fleming

2.02 MATERIALS

- A. All doors and frames shall be manufactured of commercial quality cold rolled steel per ASTM-A366 and A568 general requirements or galvanized to A40 or G60 minimum coating weight standard per ASTM-A924. Internal reinforcing may be manufactured of hot rolled pickled and oiled steel per ASTM-A569.
- B. Supports and anchors shall be fabricated of not less than 18-gauge sheet steel, galvanized where galvanized frames are used.
- C. Where items are to be built into exterior walls, inserts, bolts and fasteners shall be hot dipped galvanized in compliance with ASTM-A153, Class C or D as applicable.
- D. Rust inhibitive enamel or paint primer shall be used, baked on, and suitable as a base for specified finish paints complying with ANSI A224.1, "Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces on Steel Doors and Frames."

- E. Provide all hollow metal doors and frames receiving electrified hardware with molex wiring harness and concealed plug connectors on one end to accommodate up to twelve wires. Coordinate molex connectors on end of the wiring harness to plug directly into the electrified hardware and the electric hinge.

2.03 DOORS

- A. Provide 1 3/4" thick doors of materials and ANSI/SDI-100 grades and models specified below, or as indicated on drawings or schedules:

- 1. Interior Doors: Level 2, Model 2 – Seamless

- a. Interior doors shall be minimum 18-gauge steel with both lock and hinge rail edge of door intermittently welded, filled and ground smooth the full height of door.

- 1) Ceco: Regent-18-SEM
 - 2) Curries: 707N-18
 - 3) Fleming

- 2. Exterior Doors: Level 3, Model 2 – Seamless

- a. Exterior doors shall be minimum 16-gauge galvanized steel with both lock and hinge rail edge of door intermittently welded, filled and ground smooth the full height of door. Exterior doors shall be insulated with a solid slab of expanded polystyrene or polyurethane foam permanently bonded to the inside of each face skin. The top of all doors shall be closed flush by the addition of a 16-gauge screwed-in top cap to prevent water infiltration.

- 1) Ceco: Imperial-16-SEM
 - 2) Curries: 707N-16

- B. All doors shall be beveled 1/8" in 2" and shall have top and bottom channels of not less than 16-gauge, flush or inverted, welded to the face sheets. Doors shall have a full height 14-gauge hinge rail reinforcement channel, or individual 10 gauge hinge reinforcements.

- C. All doors to conform to ANSI-A250.4-1996 Level "A" criteria and shall be tested to 1,000,000 operating cycles and 23 twist tests. Certification of Level "A" doors is to be submitted with approval drawings by supplier upon request. Do no bid or supply any type or gauge of door not having been tested and passed these criteria.

- D. All doors shall receive flush moldings, metal lite kits are not acceptable.

2.04 FRAMES

- A. Provide hollow metal frames for doors, transoms, sidelights, borrowed lights, and other openings, of types and styles as shown on the drawings and schedules. Conceal fastenings unless otherwise indicated.

1. Interior Frames: Level 2, 16-gauge
 2. Exterior Frames: Level 2, 14-gauge galvanized
 3. Security Grade Frames: 14-gauge
 - a. Ceco: SF Series
 - b. Curries: M Series
- B. Fabricate frames with mitered and faces only welded corners, re-prime at the welded areas. All welds to be flush with neatly mitered or butted material cuts.
- C. All frames shall have minimum 7 gauge hinge reinforcements, 14-gauge lock strike reinforcing, and 12-gauge closer reinforcing.
- D. Provide temporary shipping bars to be removed before setting frames.
- E. Except on weatherstripped frames, drill stops to receive three (3) silencers on strike jambs of single frames and two (2) silencers on heads of double frames.
- F. Provide minimum 0.0179" thick steel plaster guards or mortar boxes at back of hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.

2.05 FABRICATION

- A. Fabricate steel door and frame units to be rigid, neat in appearance, and free from defects, warp, or buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site. Comply with ANSI/SDI 100 requirements.
1. Clearances shall be no more than 1/8" at jambs and heads except between non fire rated pairs of doors which may be no more than 1/4." Not more than 3/4" at the bottom of the doors.
- B. Fabricate exposed faces of doors and panels, including stiles and rails of non-flush units, from only cold-rolled steel sheet.
- C. Tolerances shall comply with SDI-117 "Manufacturing Tolerances Standard Steel Doors and Frames."
- D. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold- or hot-rolled steel sheet.
1. Unless otherwise indicated, provide exposed fasteners with countersunk flat or oval heads for exposed screws and bolts.
- E. Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable

requirements of SDI-107 and ANSI-A115 Series specifications for door and frame preparation for hardware.

- F. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site. Provide internal reinforcements for all doors to receive door closers and exit devices.
- G. Locate hardware as indicated on Shop Drawings or, if not indicated, according to the Door and Hardware Institute's (DHI) "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
- H. Provide glazing stops with minimum 0.0359-inch- thick steel or 0.040-inch- thick aluminum.
- I. Provide non-removable stops on outside of exterior doors and on secure side of interior doors for glass, louvers, and other panels in doors.
- J. Provide screw-applied, removable, glazing beads on inside of glass and other panels in doors

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install steel doors, frames, and accessories according to shop drawings, manufacturer's data, and as specified.
- B. Comply with provisions of SDI-105, "Recommended Erection Instructions for Steel Door Frames," unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
 - 1. Except for frames located in existing concrete, masonry, or gypsum board assembly construction, place frames before constructing enclosing walls and ceilings.
 - 2. In masonry construction, install at least 3 wall anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors.
 - 3. At existing concrete or masonry construction, install at least 3 completed opening anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Set frames and secure to adjacent construction with bolts and masonry anchorage devices.
 - 4. In metal-stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels. In steel-stud partitions, attach wall anchors to studs with screws.
 - 5. Install fire-rated frames according to NFPA 80.

- C. Fit hollow-metal doors accurately in frames, within clearances specified in ANSI/SDI 100. Install fire rated doors with clearances specified in NFPA 80.

3.02 ADJUSTING AND CLEANING

- A. Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer
- B. Immediately before final inspection, remove protective wrappings from doors and frames.

END OF SECTION

THIS PAGE LEFT INTENTIONALLY BLANK

SECTION 081416

FLUSH WOOD DOORS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the wood doors as shown on the drawings and/or specified herein, including but not limited to, the following:
 - 1. Interior solid core sliding wood doors and associated trim at jambs, header, and sill.

1.3 RELATED SECTIONS

- A. Construction Waste Management and Disposal - Section 017419
- B. Sustainable Design Requirements (LEED Building) - Section 018113
- C. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings Section 018113.3
- D. Construction IAQ Requirements - Section 018119
- E. Rough Carpentry - Section 061000.
- F. Joints and Sealers - Section 079200
- G. Hollow Metal Doors and Frames - Section 081113

- H. Finish hardware - Section 087100.
- I. Drywall - Section 092500.
- J. Stone and Tile - Section 093100.
- K. Resilient Flooring – Section 096519
- L. Painting and Finishing - Section 099000.
- A. Valves and connections and associated work and/or coordination in Divisions 21-23.

1.4 SUBMITTALS

- A. Product Data: Submit door manufacturer's product data, specifications and installation instructions for each type of wood door.
 - 1. Include details of core and edge construction and trim for openings.
 - 2. Include factory finish specifications.
 - 3. Include certifications to show compliance with specifications.
- B. Shop Drawings: Submit shop drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, requirements for finishing and other pertinent data.
 - 1. Include requirements for veneer matching.
- C. Submit the following
 - 1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches for each material and finish. For each wood species and transparent finish, provide set of three samples showing typical range of color and grain to be expected in the finished work.
- D. LEED BUILDING Submittal Requirements:
The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 - 1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the wood product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. Location in which wood materials were manufactured or fabricated and location from which wood was harvested.
 - c. For wood products, indication (Y/N) of whether the supplied product(s) are certified by the Forest Stewardship Council (FSC).

- c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment. Include total cost for all wood products and itemized costs for all FSC-certified wood products.
2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
5. Documentation that all composite wood and agrifiber products do not contain added urea-formaldehyde resins.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain flush wood doors through one source from a single manufacturer.
- B. Quality Standard: Comply with AWI's "Architectural Woodwork Quality Standards Illustrated"; latest edition "Premium" grade.
 1. Provide AWI Quality Certification Labels or letter of licensing for Project indicating that doors comply with requirements of grade specified.

C. LEED BUILDING Performance Criteria:

The following criteria are REQUIRED for the products included in this section:

1. Engineered wood, not including salvaged wood, shall contain a minimum of 10% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.
2. All composite wood, engineered wood, or agrifiber products (e.g., plywood, particleboard, medium density fiberboard) shall contain no added urea-

formaldehyde resins. Acceptable resins and binders include, but are not limited to, phenol formaldehyde and methyl diisocyanate (MDI). Certification of these products shall be in accordance with the Submittal Requirements of this Section.

3. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.
4. Wood Materials harvested and manufactured within 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements of this Section.
5. Permanently Installed wood-based materials used in this project that have been certified in accordance with the Forest Stewardship Council (FSC) guidelines shall be documented in accordance with the Submittal Requirements of this Section.
 - a. Applicable products include, but are not limited to, structural framing and general dimensional framing, flooring, finishes, built-in furnishings, miscellaneous blocking, fire rated plywood back panels used for equipment mounting, architectural panels, and plywood.
 - b. Certified wood material suppliers may be researched through the following websites: www.rainforest-alliance.org/greenbuilding, www.smartwood.org, <http://www.certifiedwoodsearch.org/searchproducts.aspx>, http://www.fscus.org/certified_companies/.
 - c. Wood products previously purchased and used on prior projects, which are reused on this Project, are exempt from the FSC certification requirement. Appropriate documentation certifying reused wood products must be submitted.
6. Adhesives or sealants used for work in this section shall meet the requirements of Section 018113.3 : Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
7. Clear wood finishes, floor coatings, stains, sealers, and shellacs applied to the interior shall meet the VOC limitations defined in Rule 1113, "Architectural Coatings" of SCAQMD, of the State of California. The VOC limits defined by SCAQMD, based on 7/9/04 amendments, are as follows. VOC limits are defined in grams per liter, less water and less exempt compounds.
 - a. Clear Wood Finishes
 - i. Varnish 350
 - ii. Sanding Sealers 350
 - iii. Lacquer 550
 - b. Shellac
 - i. Clear 730
 - ii. Pigmented 550
 - c. Stains 250
 - d. Floor Coatings 100

e. Waterproofing Sealers	250
f. Sanding Sealers	275
g. Other Sealers	200

7. The calculation of VOC shall exclude water and tinting color added at the point of sale
8. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in plastic bags or cardboard cartons.
- C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship, have warped (bow, cup, or twist) in excess of permitted standard noted in Article 2.5 herein, or show telegraphing of core construction in face veneers.
 1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 2. Warranty shall be in effect during the following period of time from date of Substantial Completion:
 - a. Solid Core Wood Doors: Life of installation.

PART 2 PRODUCTS

2.1 INTERIOR SOLID CORE WOOD DOORS

- A. Provide particleboard core, 1-3/4" thick, 5 ply, hot press, AWI Premium Grade solid core wood doors conforming to standards specified herein manufactured by Marshfield Door Systems, Inc., Algoma, Hardwoods Inc. or Eggers Hardwood Products Corp.
 1. Core shall consist of a formed flat panel consisting of wood particles bonded together with synthetic resins or other added binder, with an average density of 33

lbs. per cubic foot. The material shall meet or exceed the requirements of ANSI A208.1, Grade 1-LD-2 covering mat formed particleboard with face screw holding of 125 lbs., modulus of rupture of 800 psi and modulus of elasticity of 150,000 psi.

2. Core shall be capable of satisfying this WDMA TM-7 cycle slam test for surface mounted hardware. Where the manufacturer's core does not meet this criteria, stiles and rails must measure a minimum of 5-1/2" and must be fabricated of hardwood.

- a. Surface mounted hardware must be installed with 1-1/4" screw penetrations using threaded to the head screws; coordinate with Section 08700.

- B. Cross Bands: Shall be 1/16" thick hardwood extending full width of door and laid with grain at right angles to face veneers. Cross bands and faces shall be laminated to the core with Type I melamine fortified urea glue by the hot press process.

- C. Stiles, Rails: Stile edge bands shall be structural composite lumber laminated to the core. Stiles and rails must be securely glued to the core with no voids allowed.

- D. Doors shall have MDO face.

2.2 SHOP FINISH OF INTERIOR WOOD DOORS

- A. Doors shall be field painted, shop prime on all surfaces with one coat of alkyd wood primer applied to a dry film thickness of 1.5 mils.

2.3 FABRICATION

- A. Prefit and premachine wood doors at the factory.

- B. Comply with the tolerance requirements of WDMA for prefitting. Machine doors for hardware requiring cutting of doors. Comply with final hardware scheduled and door frame shop drawings, and with hardware templates and other essential information required to ensure proper fit of doors and hardware.

- C. Take accurate field measurements of hardware mortises in metal frames to verify dimensions and alignment before proceeding with machining in the factory.

- D. Doors shall be factory sized to door opening so that trimming and fitting are not required in the field.

- E. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances unless otherwise indicated:

1. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements in NFPA 80 for fire-rated doors.

- F. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3 unless otherwise noted. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

1. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.
 2. Metal Astragals: Premachine astragals and formed-steel edges for hardware for pairs of fire-rated doors.
- G. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kinds of doors required.

2.4 SOURCE QUALITY CONTROL

- A. Once installed, maximum allowable warp, bow, cut or twist in doors shall be 1/16" as measured by the 1/16 inch feeler gauge and a straight-edge extending from corner to corner of the door face at stiles, top and bottom rails and along both diagonals.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Hardware: For installation, see Division Section 087100 "Finish Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
- C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.
 - a. Comply with NFPA 80 for fire-rated doors.
 2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
 3. Bevel fire-rated doors 1/8 inch in 2 inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.
- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.2 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.

- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

SECTION 083113

ACCESS DOORS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the access doors as indicated on the drawings and/or specified herein, including but not limited to, the following:
 - 1. Frameless recessed panel access doors at drywall ceilings and walls.
 - 2. Framed flush panel access doors at masonry and tile walls.
 - 3. Install access doors and frames for access from occupied spaces to the following, where indicated or required, and as supplied by the trades of Divisions 15 and 16.
 - a. All shutoff or balancing valves.
 - b. Fire dampers, as required.
 - c. Points of duct access.
 - d. Pull boxes.
 - e. Controls of mechanical and electrical items.
 - f. Masonry shafts for pipes and conduits, as required.
 - g. Pipe spaces, if required.
 - h. Inlets of fans.
 - i. Fusible link and splitter damper at filter bank.
 - j. Automatic damper and motor.
 - k. Equipment not otherwise accessible.

1.3 RELATED SECTIONS

- A. Construction Waste Management and Disposal - Section 017419
- B. Sustainable Design Requirements (LEED Building) - Section 018113
- C. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3
- D. Construction IAQ Requirements - Section 018119
- E. Unit masonry - Section 042000
- F. Masonry Restoration and Cleaning - Section 049000
- G. Rough Carpentry – Section 061000
- I. Joint Sealers Section 079200
- J. Gypsum Drywall - Section 092500.
- K. Stone and Tile - Section 093100.
- L. Painting and Finishing- Section 099000.
- M. Valves and connections and associated work and/or coordination with work identified in Divisions 21-23.

1.4 QUALITY ASSURANCE

- A. For actual installation of the work of this Section, use only personnel who are thoroughly familiar with the manufacturer's recommended methods of installation and who are completely trained in the skills required.
- B. Fire-Resistance Ratings: Wherever a fire-resistance classification is shown, or for construction where access doors are installed, provide required access door assembly with panel door, frame, hinge and latch from manufacturers listed in Underwriters' Laboratories, Inc. "Classified Building Materials Index" for the rating shown.
 - 1. Provide UL label on each access panel.
 - 2. Provide flush, key operated cylinder lock.
- C. Size Variations: Obtain Commissioner's acceptance of manufacturer's standard size units which may vary slightly from sizes shown or scheduled.
- D. LEED BUILDING Performance Criteria:
The following criteria are REQUIRED for the products included in this section:
 - 1. Metal members shall contain a minimum of 35% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is

based on the weight of the component materials). Structural steel shall contain 75%. Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.

2. Metal members fabricated within, and containing raw materials extracted within, 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements above.
3. Adhesives or sealants used for work in this section shall meet the requirements of Section 018113.3 : Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
4. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.

1.5 SUBMITTALS

- A. Before any materials of this Section are delivered to the job site, submit complete manufacturer's literature to the Commissioner. Submit plans and schedules showing size and location of each and every access door for Commissioner's acceptance prior to installation.

- B.. LEED BUILDING Submittal Requirements:

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s) and the location (source) of the raw materials used to manufacture the product(s)
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.

4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

1.6 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during and after installation and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

PART 2 PRODUCTS

2.1 MATERIALS AND FABRICATION

- A. Provide access door assembly manufactured by Milcor Inc or Bilco, or equal made by Nystrom Inc., Karp Associates, Inc. or approved equal. Assembly shall be an integral unit complete with all parts and ready for installation.
- B. Non-Drainage Door Type TER by Bilco or equal by Milco, Nysrtom, Karp, or approved equal.
- C. Fabricate units of continuous welded steel construction. Grind welds smooth and flush with adjacent surfaces. Provide attachment devices and fasteners of the type required to secure access panels to the types of supports shown.
- D. Frames for Masonry and Tile Wall Only (Flush Panel Units)
 1. Fabricate frame from sixteen (16) gauge steel. Provide frame with exposed flange not less than one (1) inch wide around perimeter of frame for the following construction:
 - a. Exposed masonry.
 - b. Tile finish.
 2. For installation in masonry construction, provide frames with adjustable metal masonry anchors.
- E. Frameless Units for Drywall Surfaces (Recessed Panel Units)
 1. Provide access doors without exposed frames for drywall adhered to recessed panel.
- F. Panels: Fabricate from fourteen (14) gauge steel, with concealed spring hinges set to open to 175 degrees. Provide removable pin type hinges of the quantity required to

support the access panel sizes used in the work. Finish with manufacturer's factory applied baked enamel prime coat applied over phosphate protective coating on steel.

G. Locking Devices

1. For non-rated access doors, provide flush, screwdriver operated cam locks of number required to hold door in flush, smooth plane when closed.
2. For fire rated doors, provide locks as described in paragraph 1.04, B. herein.

- H. Inserts and Anchorage: Furnish inserts and anchoring devices which must be built into masonry for the installation of access panels. Provide setting drawings, templates, instructions, and directions for installation of anchorage devices. Coordinate delivery with other work to avoid delay.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where access doors are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 COORDINATION

- A. Coordinate all work with the mechanical trades to insure proper locations and in a timely manner to permit orderly progress of the total work.
- B. Set frames accurately in position and securely attach to supports with face panels plumb or level in relation to adjacent finish surfaces.
- C. Adjust hardware and panels after installation for proper operation.
- D. Remove and replace panels or frames which are warped, bowed, or otherwise damaged.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 083326

OVERHEAD COILING GRILLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

B. LEED BUILDING - GENERAL REQUIREMENTS:

The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SUMMARY

A. Section Includes:

1. Overhead coiling grilles.
2. Hardware and accessories.

B. Related Sections:

1. Construction Waste Management and Disposal - Section 017419
2. Sustainable Design Requirements (LEED Building) - Section 018113
3. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3
4. Construction IAQ Requirements - Section 018119
5. Unit masonry - Section 042000
6. Masonry Restoration and Cleaning - Section 049000
7. Miscellaneous Metals Section 055000
8. Sheet Metal Flashing – Section 076200

9. Flexible Flashing - Section 076500
10. Joints and Sealers - Section 079200
11. Painting and Finishing - Section 099000.
12. Work in associated Divisions 21-23, 26-28

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design overhead coiling grilles, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Seismic Performance: Overhead coiling grilles shall withstand the effects of earthquake motions determined according to SEI/ASCE 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."
- C. Operation Cycles: Provide overhead coiling grille components and operators capable of operating for not less than number of cycles indicated for each grille. One operation cycle is complete when a grille is opened from the closed position to the fully open position and returned to the closed position.
- D. LEED BUILDING - GENERAL REQUIREMENTS:

The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type and size of overhead coiling grille and accessory. Include the following:
 1. Construction details, material descriptions, dimensions of individual components, profiles for curtain components, and finishes.
 2. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
- B. LEED BUILDING Submittal Requirements:

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications.
 2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
 3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
 4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
 5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the LEED Consultant for review.
- C. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. 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.
- D. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.
1. Include similar Samples of accessories involving color selection.
- E. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
1. Closed-Curtain Grille: 18-inch- square assembly with full-size components consisting of ribs and infill as required to illustrate each assembly.
 2. Bottom Bar: 6 inches long.
 3. Guides: 6 inches long.
 4. Brackets: 6 inches square.
 5. Hood: 6 inches square.
- F. Delegated-Design Submittal: For overhead coiling grilles indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
1. Detail fabrication and assembly of seismic restraints.
 2. Summary of forces and loads on walls and jambs.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Seismic Qualification Certificates: For overhead coiling grilles, accessories, and components, from manufacturer.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For overhead coiling grilles to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
- B. Source Limitations: Obtain overhead coiling grilles from single source from single manufacturer.
 - 1. Obtain operators and controls from overhead coiling grille manufacturer.
- C. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.8 WARRANTY

- A. The Contractor shall warrant that all Overhead Coiling Grilles Work executed under this Section will be free from defects in materials, operation and workmanship for a period of two (2) years from date of acceptance of the Project, and he shall remedy any defects in the Overhead Coiling Grilles Work.

PART 2 - PRODUCTS

2.1 GRILLE CURTAIN MATERIALS AND CONSTRUCTION

- A. Type A: Closed-Curtain Grilles: 22 gauge G-60/G-90 galvanized steel
 - a. Perforations: .062 diameter openings on .094 staggered centers allowing air and light to pass through without sacrificing security.
- B. Type B: Open-Curtain Grille
 - a. ½ OD 18 gauge electro galvanized steel horizontal tubes with 14 gauge x 3/4" electro galvanized steel connecting rings.

- C. Endlocks: Continuous end links, chains, or other devices at ends of rods; locking and retaining grille curtain in guides against excessive pressures, maintaining grille curtain alignment, and preventing lateral movement.
- D. Bottom Bar: Manufacturer's standard continuous channel or tubular shape, finished to match grille.
 - 1. Astragal: Equip each grille bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.
- E. Grille Curtain Jamb Guides: Manufacturer's standard shape having curtain groove with return lips or bars to retain curtain. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise; with removable stops on guides to prevent overtravel of curtain.
 - 1. Removable Posts and Jamb Guides: Manufacturer's standard.

2.2 HOODS AND ACCESSORIES

- A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
 - 1. Galvanized Steel: Nominal 0.028-inch- thick, hot-dip galvanized steel sheet with G90 (Z275) zinc coating, complying with ASTM A 653/A 653M.
 - 2. Stainless Steel: 0.025-inch- thick stainless-steel sheet, Type 304, complying with ASTM A 666.
 - 3. Aluminum: 0.040-inch- thick aluminum sheet complying with ASTM B 209, of alloy and temper recommended by manufacturer and finisher for type of use and finish indicated.
- B. Removable Metal Soffit: Formed or extruded from same metal and with same finish as curtain if hood is mounted above ceiling, unless otherwise indicated.
- C. Mounting Frame: Manufacturer's standard mounting frame designed to support grille; factory fabricated from ASTM A 36/A 36M structural-steel shapes, hot-dip galvanized per ASTM A 123/A 123M; fastened to floor and structure above grille; to be built into wall construction; and complete with anchors, connections, and fasteners.
- D. Push/Pull Handles: Equip each push-up-operated or emergency-operated grille with lifting handles on each side of grille, finished to match grille.
 - 1. Provide pull-down straps or pole hooks for grilles more than 84 inches high.

2.3 LOCKING DEVICES

- A. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.
- B. Chain Lock Keeper: Suitable for padlock.

2.4 COUNTERBALANCING MECHANISM

- A. General: Counterbalance grilles by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of parts and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.
- C. Spring Balance: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.
- D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
- E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.5 MANUAL GRILLE OPERATORS

- A. Equip grille with manufacturer's recommended manual grille operator unless another type of grille operator is indicated.
- B. Push-up Grille Operation: Design counterbalance mechanism so required lift or pull for grille operation does not exceed 25 lbf.
- C. Chain-Hoist Operator: Consisting of endless steel hand chain, chain-pocket wheel and guard, and gear-reduction unit with a maximum 25 lbf force for grille operation. Provide alloy-steel hand chain with chain holder secured to operator guide.

2.6 CLOSED-CURTAIN GRILLE ASSEMBLIES

- A. Closed-Curtain Grille: Overhead coiling grille of perforated 22 guage G-60/G-90 galvanized steel sections.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide City-Gates Perforated Doors- City-Screen or comparable product by one of the following:

- a. Mr. Locks Security Systems
 - b. Accordion Doors
 - c. Or approved equal.
- B. Open-Curtain Grille: Overhead coiling grille of curved horizontal tubes.
- 1. Basis-of-Design Product: Subject to compliance with requirements, provide City-Gates *Eurogrille* or comparable product by one of the following:
 - a. Mr. Locks Security Systems
 - b. Accordion Doors
 - c. Or approved equal.
- C. Operation Cycles: Not less than 20,000.
- 1. Include tamperproof cycle counter.
- D. Curtain Jamb Guides: Aluminum with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.
- E. Hood: Match curtain material and finish.
- 1. Shape: As shown on Drawings.
 - 2. Mounting: Face of wall.
- F. Locking Devices: Equip grille with slide bolt for padlock and chain lock keeper.
- G. Manual Grille Operator: Push-up operation or Chain-hoist operator.
- H. Grille Finish:
- 1. As selected by Commissioner from full range of industry colors and color densities.
- 2.7 GENERAL FINISH REQUIREMENTS
- 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.
- 2.8 ALUMINUM FINISHES
- A. Mill Finish: Manufacturer's standard.

- B. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
- C. Color Anodic Finish: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.
- D. Baked-Enamel or Powder-Coat Finish: AAMA 2603. Comply with coating manufacturer's written instructions for cleaning, conversion coating, application, and baking.

2.9 STEEL AND GALVANIZED-STEEL FINISHES

- A. Factory Prime Finish: Manufacturer's standard primer, compatible with field-applied finish. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.
- B. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
- B. Examine locations of electrical connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install overhead coiling grilles and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Install overhead coiling grilles, hoods, and operators at the mounting locations indicated for each grille.
- C. Accessibility: Install overhead coiling grilles, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

3.3 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Perform installation and startup checks according to manufacturer's written instructions.

2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly so that grilles operate easily, free of warp, twist, or distortion.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train City of New York's maintenance personnel to adjust, operate, and maintain overhead coiling grilles.

END OF SECTION 083326

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 084113

ALUMINUM ENTRANCES AND STOREFRONT

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the aluminum storefronts as indicated on the drawings and/or specified herein including the following:
 - 1. Exterior storefront systems
 - 2. Associated operable doors
 - 3. Operable Doors and Transoms at the interior.

1.3 RELATED SECTIONS

- 1. Construction Waste Management And Disposal - Section 017419
- 2. Sustainable Design Requirements (LEED Building) - Section 018113
- 3. Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints And Coatings - Section 018113.3
- 4. Construction IAQ Requirements – Section 018119
- 5. Unit Masonry – Section 042000
- 6. Masonry Restoration and Cleaning – Section 049000
- 7. Miscellaneous Metal – Section 055000

8. Rough Carpentry – Section 061000
9. Sheet Metal Flashing – Section 076200
10. Flexible Flashing – Section 076500
11. Joint Sealers - Section 079200.
12. Aluminum Windows and Doors - Section 085113.
13. Finish hardware - Section 087100.
14. Glass and glazing - Section 088000.
15. Gypsum Drywall – Section 092500
16. Painting and Finishing – Section 099000
17. Breathable Masonry Coating- Section 099200
18. Divisions 26-28

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's printed product data, specifications, standard details, installation instructions, use limitations and recommendations for each material used. Provide certifications that materials and systems comply with specified requirements.
- B. Shop Drawings: Provide large scale shop drawings for fabrication, installation and erection of all parts of work. Provide plans, elevations, and details of anchorages, connections and accessory items. Provide installation templates for work installed by others. Show interfaces and relationships to work of other trades.
 1. Shop drawings of building elevations shall be at scale of 1/8" = 1'-0", or larger. Other shop drawings shall be at a scale that is normal to trade, or larger if required by Commissioner.
 2. Shop drawings of building elevations shall show layout of Perforated Adhesive Graphic Film on Aluminum Entrances and Storefronts and be fully coordinated with Shop Drawings for Breathable Masonry Coating- Section 099200.
- C. Field Measurements: Take necessary field measurements before preparation of shop drawings and fabrication. Do not delay progress of job. If field measurements are not possible prior to fabrication, allow for field cutting and fitting.
- D. Initial Selection Samples: Submit samples showing complete range of colors, textures, and finishes available for each material used.
- E. Verification Samples: Submit representative samples of each material that is to be exposed in completed work. Show full color ranges and finish variations expected. Provide samples having minimum size of 144 sq. in.

F. LEED BUILDING Submittal Requirements:

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications.
2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION
4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the LEED Consultant for review.

1.5 QUALITY ASSURANCE

- A. Source: For each material type required for work of this Section, provide primary materials which are products of one manufacturer. Provide secondary or accessory materials which are acceptable to manufacturers of primary materials.
- B. Installer: A firm with a minimum of three years experience in type of work required by this Section and which is acceptable to manufacturers of primary materials.
- C. Design Criteria: Drawings indicate sizes, member spacings, profiles, and dimensional requirements of work of this Section. Minor deviations will be accepted in order to utilize manufacturer's standard products when, in the Commissioner's sole judgment, such deviations do not materially detract from the design concept or intended performances.

1.6 TESTS AND PERFORMANCE REQUIREMENTS

- A. Manufacturer's Standard Tests: Provide manufacturer's standard test data showing compliance with specified requirements.
- B. System shall be vandal and/or burglar resistant.
- C. Seismic Loads: Provide entrance and storefront systems, including anchorage, capable of withstanding the effects of earthquake motions calculated according to requirements

of authorities having jurisdiction or ASCE 7, "Minimum Design Loads for Buildings and Other Structures", Section 9, "Earthquake Loads", whichever are more stringent.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials and products in unopened, factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations. Store under cover and protect from weather damage.
- B. Sequence deliveries to avoid delays, but minimize on-site storage.

1.8 WARRANTIES

- A. Provide written warranty, signed by manufacturer, agreeing to repair or replace work that exhibits defects in materials or workmanship. "Defects" is defined to include, but not limited to, leakage of water, abnormal aging or deterioration, abnormal deterioration or fading of finishes, and failure to perform as required. Include requirement for removal and replacement of covering and connected adjacent work.
 - 1. Warranty Period: Three (3) years from date of Substantial Completion; except finish shall be warranted for a period of fifteen (15) years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS/PRODUCTS

- A. Provide storefronts and entrance systems of one of the following manufacturers that meet or exceed requirements of these specifications:
 - 1. Exterior Storefront
 - a. Basis of Design: Efco Series 403-I Framing & D302(TS) Entrance.
 - b. Kawneer Company, Inc., Trifab
 - c. Wausau Window & Wall Systems
 - d. Or approved equal.
 - 2. Interior Storefront
 - a. Basis of Design: Efco Series 401 Framing & D500 Entrance
 - b. Kawneer Company, Inc., Trifab
 - c. Wausau Window & Wall Systems
 - d. Or approved equal.

2.2 MATERIALS AND ACCESSORIES

- A. Aluminum Members: Provide 6063-T5 alloy and temper as recommended by manufacturer for strength, corrosion resistance, and application of required finish. Comply with ASTM B 221 for extrusions, and ASTM B 209 for sheet/plate. Provide

0.125 in. thick extrusions for door stiles and storefront framing. Provide 0.050 in. thick aluminum for glazing moldings.

1. Structural aluminum shapes shall conform to ASTM B 308.

B. 1" Aluminum Infill Panels

1. 1" insulated 5-ply panel, both sides finished with polyiso core, smooth aluminum skins finished to match frame.

C. Perforated Adhesive Graphic Film

- a. 3m Scotchcal Perforated Window Graphic Film
- b. Flexcon Seethru-Sign STSWBF2
- c. Mactac IMAGin JT5916P Perforated one-way Visibility Film
- d. Or approved equal

- D. Fasteners: Provide non-magnetic stainless steel fasteners, warranted by manufacturer to be non-corrosive and compatible with aluminum components.

- E. Concealed Flashing: Dead-soft stainless steel, 26 gage minimum, or extruded aluminum 0.062 in. minimum, of an alloy and type selected by manufacturer for compatibility with other components.

- F. Brackets and Reinforcements: Non-magnetic stainless steel or hot-dip galvanized steel complying with ASTM A 386.

- G. Concrete/Masonry Inserts: Cast-iron, malleable iron, or hot-dip galvanized steel complying with ASTM A 386.

- H. Bituminous Coatings: Cold-applied asphalt mastic compounded for 30-mil thickness per coat.

- I. Compression Weatherstripping: Manufacturer's standard replaceable stripping of molded neoprene or PVC gaskets complying with ASTM D 2287.

- J. Sliding Weatherstripping: Manufacturer's standard replaceable stripping of wool, polypropylene, or nylon woven pile, with nylon fabric or aluminum strip backing.

2.3 HARDWARE

- A. Provide hardware units as indicated, scheduled, or required for operation of each door. Refer to Section 08710, Finish Hardware for hardware description.

2.4 FABRICATION

- A. Sizes and Profiles: Required sizes for door and frame units, including profile requirements, are indicated on Drawings. Any variable dimensions are indicated, together with maximum and minimum dimensions required to achieve design requirements and coordination with other work.

- B. Prefabrication: To greatest extent possible, complete fabrication, assembly, finishing, hardware application, and other work before shipment to project site. Disassemble components only as necessary for shipment and installation.
1. Preglaze door and frame units to greatest extent possible, in coordination with installation and hardware requirements.
 2. Do not drill and tap for surface-mounted hardware items until time of installation at project site.
 3. Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal work in manner which prevents damage to exposed finish surfaces. For hardware, perform these operations prior to application of finishes.
- C. Welding: Comply with recommendations of American Welding Society to avoid discoloration; grind exposed welds smooth and restore mechanical finish.
- D. Reinforcing: Install reinforcing as necessary for performance requirements; separate dissimilar metals with bituminous paint or other separator to prevent corrosion.
- E. Continuity: Maintain accurate relation of planes and angles, with hairline fit of contacting members.
- F. Fasteners: Conceal fasteners.
- G. Provide EPDM/vinyl blade gasket weatherstripping in bottom exterior door rail, adjustable for contact with threshold.
- H. At interior doors and other locations without weatherstripping, provide neoprene silencers on stops to prevent metal-to-metal contact.
- I. Provisions shall be made in the framing for minimum edge clearance, nominal edge cover, and nominal pocket width for the thickness and type of glazing installed, and shall be in accordance with the FGMA Glazing Manual.
- J. Pocket glazed framing shall provide:

	<u>Ins. Glass</u>
1. Nominal edge cover (or bite) framing only	1/2"
2. Min. nominal edge clearance	1/4"
3. Min. face clearance	5/32"

2.5 STOREFRONT FRAMING

- A. General: Provide inside-outside matched resilient flush glazed system with provisions for glass replacement. Shop fabricate and pre-assemble frame components where possible.

- B. Thermal-Break Construction: Fabricate exterior aluminum storefront framing system with integrally concealed, low conductance thermal barrier, located between exterior materials and exposed interior members, in manner which eliminates direct metal-to-metal contact. Provide manufacturer's standard construction which has been in use for similar projects for at least three years.
- C. For glass and glazing, refer to Section 08800.

2.6 FINISH

- A. Clear anodized, Class II, per AAMA 611.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where aluminum entrances and storefronts are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Install aluminum entrance doors and storefront framing in openings prepared under other Sections plumb, square, level, in exact alignment with surrounding work, with proper clearances, and securely and positively anchored to building structure, to meet performance requirements specified herein, in accordance with manufacturer's published instructions and approved submittals.
- B. Use only skilled mechanics for erection, under supervision of manufacturer's representative.
- C. Provide protection against galvanic action. Isolate dissimilar materials with bituminous coating or non-absorptive dielectric tape.
- D. Install aluminum entrance doors, storefront frame, and finish hardware. Carefully fit and adjust doors and hardware to frames and weatherstripping. After erection check and adjust operating hardware for smooth and proper operation.
- E. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction, unless otherwise indicated. Comply with requirements of Section 07900.
- F. Erection Tolerances: Install entrance and storefront systems to comply with the following maximum tolerances.
 - 1. Variation from Plane: Limit variation from plane or location shown to 1/8" in 12'; 1/4" over total length.
 - 2. Alignment: Where surfaces abut in line, limit offset from true alignment to 1/16". Where surfaces meet at corners, limit offset from true alignment to 1/32".

3. Diagonal Measurements: Limit difference between diagonal measurements to 1/8".

3.3 PROTECTION AND CLEANING OF ALUMINUM

- A. Protect finished metal surfaces from damage during fabrication, shipping, storage, and erection, and from then until acceptance by The City of New York.
- B. Clean metal surfaces promptly after installation, exercising care to avoid damage. Remove excess sealant, dirt, and other substances. Lubricate hardware and other moving parts.

3.4 PROTECTION AND CLEANING OF GLASS

- A. Replace glass that is broken, cracked or chipped prior to time of final acceptance of Project by The City of New York.
 - B. Clean glass surfaces promptly after installation, exercising care to avoid damage to same.
- END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 085113

ALUMINUM WINDOWS AND DOORS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this section is part of Add Alternate 3.
- B. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the aluminum windows as shown on the drawings and/or specified herein, including but not limited to, the following:
 - 1. Aluminum windows, double-hung operation and fixed.
 - 2. Miscellaneous insulation at window frames.
 - 3. Anchors, hardware and accessories including trim pieces and panning.
 - 4. Perforated Adhesive Graphic Film

1.3 RELATED SECTIONS

- 1. Construction Waste Management And Disposal - Section 017419
- 2. Sustainable Design Requirements (LEED Building) - Section 018113
- 3. Volatile Organic Compound (Voc) Limits For Adhesives, Sealants, Paints And Coatings - Section 018113.3
- 4. Construction IAQ Requirements – Section 018119

5. Unit masonry - Section 042000.
6. Masonry Restoration and Cleaning - Section 049000
7. Miscellaneous Metals Section 055000
8. Rough Carpentry - Section 061000.
9. Building Insulation - Section 072100
10. Sheet Metal Flashing - Section 076200
11. Flexible Flashing Section - 076500
12. Joints and Sealers Section - 079200
13. Glass and glazing - Section 088000.
14. Breathable Masonry Coating- Section 099200
15. Associated work and/or coordination in Divisions 21-23, 26-28

1.4 PERFORMANCE REQUIREMENTS

- A. Windows shall conform to the "Voluntary Specification for Aluminum Prime Windows & Sliding Glass Doors" as published by ANSI/AAMA 101/I.S.2-97 unless more stringent requirements are specified. Windows shall conform to minimum standards of AW60 for awning windows.
- B. Performance and Testing: Except as otherwise indicated, comply with air infiltration tests, water resistance tests and applicable load tests specified in ANSI/AAMA 101/I.S.2-97 for type and classification of window units required in each case.
 1. Testing: Where manufacturer's standard window units comply with requirements and have been tested in accordance with specified tests, provide certification by manufacturer to the Commissioner and The City of New York showing compliance with such tests; otherwise, perform required tests through an AAMA-accredited testing laboratory or agency, and provide certified test results to the Commissioner and The City of New York.
 2. Test reports shall be not more than four years old.
 3. Sample submitted for tests shall be manufacturer's standard construction and whose overall dimensions shall be at least the lay-out size window and window/door unit required for this Project. Sequence of test shall be optional between manufacturer and the testing laboratory except that in all cases, air infiltration test shall be performed before water resistance test. Sash in sample shall contain the approximate configuration as that of windows to be tested.
 4. To evaluate testing and measure product performance, testing shall be conducted on manufacturer's standard product glazed with type of glazing material specified herein.

- C. A thermal transmittance test and a condensation resistance test shall be conducted according to AAMA 1503-04, "Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections". Standard test conditions as specified in Section 9.1 of the 1503.1-04 shall be used. Windows shall meet the following minimum criteria:
1. Condensation Resistance Test (CRF)
 - a. With window sash and ventilators closed and locked, test unit in accordance with AAMA 1502.7.
 - b. Condensation Resistance Factor (CRF) shall be not less than 50.0 for glass and 55.0 for frame.
 2. Thermal Transmittance Test (Conductive U-Value)
 - a. With window sash and ventilators closed and locked, test unit in accordance with AAMA 1503.0.
 - b. Conductive thermal transmittance (U-value) shall be not more than 0.60 BTU/hr/sf/deg. F.
- D. Manufacturers shall have been engaged in the manufacture of aluminum windows of grades specified for not less than 5 years.
- E. Provide anchorage of window to building substrate to withstand pressure or suction winds loads per requirements of the Building Code but not less than 30psf.
- F. Life Cycle Testing: When tested in accordance with AAMA 910-93, there is to be no damage to fasteners, hardware parts, support arms, activating mechanisms or any other damage which would cause the window to be inoperable at the conclusion of testing. Air infiltration and water resistance tests shall not exceed the primary performance requirements specified.
- G. Fabricate and install window to allow for thermal movement of materials when subject to a temperature differential from -30 deg. F. to +180 deg. F. without damage of any finish.
- H. Take field measurements of existing openings prior to submitting shop drawings and show same on shop drawings for each opening. Note that the Contract Drawings show general locations and sizes of windows, but the Contractor shall remain responsible for all field measurements, quantities, etc.

1.5 SUBMITTALS

A. Shop Drawings

1. Shop drawings shall show in detail and fully indicate the location and the quantities of all the work, the kind, finish, size, section of each unit, overall and detail dimensions, factory and field joint locations, arrangements and details, location and detail of each piece of anchorage, flashings, supporting construction provisions for the work of others.

2. Shop drawings shall show all surrounding conditions on elevations and details, including steel, concrete, masonry, lintels, block, and anchorage; all correctly dimensioned.
3. Shop drawings of building elevations shall be at scale of $1/8" = 1'-0"$, or larger. Other shop drawings shall be at a scale that is normal to trade, or larger if required by Commissioner.
4. Shop drawings of building elevations shall show layout of Perforated Adhesive Graphic Film on Aluminum Windows and be fully coordinated with Shop Drawings for Breathable Masonry Coating- Section 099200.
5. Contract drawings may not be used (reproduced, enlarged, reduced, etc.) by Subcontractor for shop drawings.
6. Shop drawings also shall fully demonstrate all requirements respecting the manufacture, finishing, handling, storage, carting sequence and erection of all materials specified herein.
7. Show joinery techniques, provision for horizontal and vertical expansion, drainage and weep systems, glass and metal thicknesses and framing member profiles.
8. Identify all materials, including metal alloys, glass types, fasteners, and glazing materials. Identify all shop and field sealants by product name and locate on drawings. Glazing details shall be at full size scale.
9. Show dimensioned position of glass edge relative to metal rabbet.
10. Shop drawings shall show attachments of window assemblies to adjoining construction and location of all work; kind, finish and size of frames, overall and detail dimensions, location and detail of each anchorage; supporting and adjoining construction; provision for the work of other trades; and all other required information.
11. Contractor shall verify all measurements of existing window openings in the field before commencing fabrication.
12. Any proposed deviations from work shown on the Contract drawings shall be indicated and so identified on shop drawings for Commissioner's review.

B. Samples

1. Submit 12" long sample of extrusion with specified finish.
2. Two full size corner sections of all types of aluminum frame, showing construction, glass and finishing - 12" x 12". Submit one section with Perforated Adhesive Graphic Film on glass and one section without.
3. All fasteners, straps, hardware, locks and keys, sealant, etc.

C. Submit certified test results as required herein.

D. Warranty as noted in 1.8.

- E. Window manufacturer and Contractor for work of this section must each submit references of prior projects similar in size, scope and window type.
- F. Product Data
 - 1. Submit manufacturer's printed product data, specifications, standard details, installation instructions, use limitations and recommendations for each material used. Provide certifications that materials and systems comply with specified requirements.
- G. LEED BUILDING Submittal Requirements:
The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 - 1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications.
 - 2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
 - 3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION
 - 4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
 - 5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the LEED Consultant for review.

1.6 DELIVERY, STORAGE AND HANDLING

A. Protection

- 1. Materials shall be packed, loaded, shipped, unloaded, stored and protected in a manner which will avoid abuse, damage and defacement in accordance with the recommendations contained in the AAMA Aluminum Curtain Wall Manual #10 entitled "Care and Handling of Architectural Aluminum From Shop to Site".
- 2. Remove all paper type wrappings and interleavings that are wet or which could become wet when unloading materials.
- 3. Store inside structure in space designated by The City of New York.

4. Stack vertically or on edge so that water cannot accumulate on or within materials using wood or plastic shims between components to provide water drainage and air circulation.
5. Cover materials with tarpaulins or plastic hung on frames to provide air circulation and prevent contaminants from contacting aluminum.
6. Keep water away from stored assemblies.
7. The Contractor shall be responsible for taking the steps necessary to protect the materials from careless handling of tools, weld splatter, acids, roofing tar, solvents, abrasive cleaners, and other items that could damage window components and finish.

1.7 QUALITY ASSURANCE

- A. The manufacturer providing the material or equipment specified in this section must, for the past five (5) years, have been regularly engaged in the manufacture of material or equipment similar in type to that required for this Project. Such similar material or equipment provided by the manufacturer must have been in satisfactory service for not less than five (5) years.
- B. The contractor or subcontractor performing the work of this section must, within the last five (5) consecutive years prior to the bid opening, have successfully completed in a timely fashion at least three (3) projects similar in scope and type to the required work.
- C. Contractor shall require representative of manufacturer of the windows to provide field instructions and supervision of the installation of the windows.
- D. Contractor shall require the manufacturer's representative to make sure that the subcontractor's workmen are fully instructed and trained in the handling and application of all the materials, and shall see that all the materials are correctly installed.
- E. Upon completion of the installation, the Contractor shall submit to the Commissioner in written form certification that the representative of the manufacturer of the windows has supervised the work of this Section and that all windows are correctly installed.

1.8 WARRANTY

- A. Aluminum Windows and Related Materials
 1. Ten (10) year manufacturer's warranty on materials and workmanship including finish on aluminum and on glass and glazing.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Acceptable Manufacturers and System to be the same source as that used for the Aluminum Entrance and Storefront elsewhere:

1. Basis of Design: Efco Series S-670
 2. equal by Kawneer
 3. equal by Wausau
 4. or approved equal
- B. Window Operation
1. Fixed
 2. Double-Hung
- 2.2 DOUBLE-HUNG & FIXED WINDOWS
- A. Aluminum
1. Extruded aluminum shall be 6063-T6 alloy and tempered.
- B. Hardware
1. Sweep latches shall be of white bronze with a US25D brushed finish.
 2. An extruded aluminum spring catch shall be provided at the head of the windows to securely hold the top sash in position.
 3. An optional extruded aluminum spring catch shall be provided at the sill of the lower sash.
 4. Windows with spring latches shall also have standard sweep latches at the meeting rail.
- C. Balances
1. Balances shall be of appropriate size and capacity to hold sash in position in accordance with AAMA 101, Section 2.2.1.3.2 and AAMA 902, Section 8.1.
 2. Balances shall be high performance sash balances that are tested in accordance with AAMA 902 "Voluntary Specification for Sash Balances".
 3. Balances shall meet all minimum AAMA 902 Class 5 requirements with a minimum .30 Manually Applied Force ratio (MAF).
 4. Balances shall be attached to a locking carrier system that slides on extruded rails in the jamb channels. Sash shall be field removable for installation and maintenance. Mounting brackets that are screw attached to the sash will not be allowed.
- D. Weather-Strip
1. All primary weather-strip shall be FIN-SEAL® or equal.
- E. Glass – See Glass & Glazing 088000
- F. Perforated Adhesive Graphic Film
- a. 3m Scotchcal Perforated Window Graphic Film
 - b. Flexcon Seethru-Sign STSWBF2
 - c. Mactac IMAGin JT5916P Perforated one-way Visibility Film
 - d. Or approved equal
- G. Thermal Barrier

1. All exterior aluminum shall be separated from interior aluminum by a rigid, structural thermal barrier. For purposes of this specification, a structural thermal barrier is defined as a system that shall transfer shear during bending and, therefore, promote composite action between the exterior and interior extrusions.
2. Sills are thermally broken with 2 thermal struts, consisting of glass reinforced polyamide nylon, mechanically crimped in raceways extruded in the exterior and interior extrusions. All other frames and sash are thermally broken using the latest technology in two-part, high-density polyurethane. A nonstructural thermal barrier is unacceptable.

2.3 FABRICATION

A. General

1. All aluminum frame and vent extrusions shall have a minimum wall thickness of .080" (2 mm). Frame sill members shall have a minimum wall thickness of .094" (2.3 mm).
2. Mechanical fasteners, welded components, and hardware items shall not bridge thermal barriers.
3. Depth of frame shall not be less than 3 7/8" (98 mm).

B. Frame

1. Frame components shall be mechanically fastened.

C. Sash

1. All sash extrusions shall have a minimum wall thickness of .080" (2 mm).
2. All horizontal sash extrusions shall be tubular.
3. Corner connections shall be mechanically fastened.

D. Screens

1. Screen frames shall be extruded aluminum.
2. Screen mounting holes in the window frame shall be factory drilled.
3. Screen mesh shall be aluminum or fiberglass.

E. Glazing

1. All units shall be glazed with the manufacturer's standard sealant process provided the glass is held in place by a removable, extruded aluminum, glazing bead. The glazing bead must be isolated from the glazing material by a gasket.

F. Finish

1. Anodic

- a. Finish all exposed areas of aluminum windows and components with electrolytically deposited color in accordance with Aluminum Association Designation AA-M10-C22-A41. Color shall be clear anodized.

PART 3 EXECUTION

3.1 INSPECTION AND REMOVALS

- A. Examine surfaces and conditions where aluminum windows are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

12/21/2012

- B. Verify dimensions taken at the job site affecting the work. Bring field dimensions which are at variance to the attention of the Commissioner. Obtain decision regarding corrective measures before the start of installation.

3.2 INSTALLATION

- A. Use only skilled tradesman with work done in accordance with approved Shop Drawings and specifications.
- B. Plumb and align window faces in a single plane for each wall plane and erect windows and materials square and true adequately anchored to maintain positions permanently when subjected to normal thermal and building movement and specified wind loads.
- C. Adjust windows for proper operation after installation.
- D. Furnish and apply sealants to provide a weathertight installation at all metal-to-metal joints and intersections of frames and at opening perimeters. Wipe off excess material and leave all exposed surfaces and joints clean and smooth.
- E. Aluminum shall be insulated from direct contact with steel, masonry, concrete, or non-compatible materials by bituminous paint, zinc chromate primer, or other suitable insulation material.
- F. Blanket insulation shall be installed behind aluminum covers, panning and trim to insure thermally insulated seal.

3.3 ADJUSTING AND CLEANING

- A. After completion of window installation, windows shall be inspected, adjusted, put into working order and left clean, free of labels, etc.
- B. Glass that is broken, damaged, cracked, or permanently stained shall be replaced.
- C. Final cleaning of finish shall be in accordance with AAMA 610.1.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 087100

FINISH HARDWARE

PART 1 – GENERAL

1.01 SUMMARY

A. SECTION INCLUDES

1. The work in this section includes furnishing all items of finish hardware as hereinafter specified or obviously necessary for all swinging, sliding, folding and other doors. Except items, which are specifically excluded from this section of the specification or of unique hardware, specified in the same sections as the doors and frames on which they are installed.

B. RELATED DOCUMENTS

1. Related documents, drawings and general provisions of contract, including General and Supplementary Conditions and Division 1 specification sections apply to this section.

C. RELATED SECTIONS

1. Construction Waste Management and Disposal - Section 017419
2. Sustainable Design Requirements (LEED Building) - Section 018113
3. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3
4. Construction IAQ Requirements - Section 018119
5. Hollow Metal Doors and Frames- Section 081113
6. Flush Wood Doors- Section 081416
7. Aluminum Framed Entrances and Storefronts- Section 084113
8. Aluminum Windows And Doors -Section 085113
9. Glass and Glazing- Section 088000
10. Division 26 – Electrical

1.02 REFERENCES

A. STANDARDS

1. ANSI A156.1 – Butts and Hinges
2. ANSI A156.2 – Bored Locks and Latches
3. ANSI A156.3 – Exit Devices
4. ANSI A156.4 – Door Controls – Door Closers
5. ANSI A156.5 – Auxiliary Locks and Associated Products
6. ANSI A156.6 – Architectural Door Trim
7. ANSI A156.7 – Template Hinge Dimensions
8. ANSI A156.8 – Door Controls – Overhead Holders
9. ANSI A156.13 – Mortise Locks and Latches

10. ANSI A156.15 – Closer Holder Release Devices
11. ANSI A156.16 – Auxiliary Hardware
12. ANSI A156.18 – Material and Finishes
13. NFPA80 – Fire Doors and Windows
14. UL10C – Positive Pressure Fire Tests of Door Assemblies

B. CODES

1. NFPA 101 – Life Safety Code
2. IBC 2000 – International Building Code
3. ANSI A117.1 – Accessible and Usable Buildings and Facilities
4. ADA – Americans with Disabilities Act

1.03 SUBMITTALS

A. LEED BUILDING Submittal Requirements:

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, Sustainable Design Requirements (LEED Building) - Section 018113 of these specifications.
2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the LEED Consultant for review.

B. GENERAL REQUIREMENTS

1. Submit copies of finish hardware schedule in accordance with Division 1, General Requirements.

C. SCHEDULES AND PRODUCT DATA

1. Schedules to be in vertical format, listing each door opening, and organized into "hardware sets" indicating complete designations of every item required for each door opening to function as intended. Hardware schedule shall be submitted within two (2) weeks from date the purchase order is received by the finish hardware supplier. Furnish four (4) copies of revised schedules after approval for field and file use. Note any special mounting instructions or requirements with the hardware schedule. Schedules to include the following information:
 - a. Location of each hardware set cross-referenced to indications on drawings, both on floor plans and in door and frame schedule.
 - b. Handing and degree of swing of each door.
 - c. Door and frame sizes and materials.
 - d. Keying information.
 - e. Type, style, function, size, and finish of each hardware item.
 - f. Elevation drawings and operational descriptions for all electronic openings.
 - g. Name and manufacturer of each hardware item.
 - h. Fastenings and other pertinent information.
 - i. Explanation of all abbreviations, symbols and codes contained in schedule
 - j. Mounting locations for hardware when varies from standard.
2. Submit catalog cuts and/or product data sheets for all scheduled finish hardware.
3. Submit separate detailed keying schedule for approval indicating clearly how the City of New York's final instructions on keying of locks has been fulfilled.

D. SAMPLES

1. Upon request, samples of each type of hardware in finish indicated shall be submitted. Samples are to remain undamaged and in working condition through submittal and review process. Items will be returned to the supplier or incorporated into the work within limitations of keying coordination requirements.

E. TEMPLATES

1. Furnish a complete list and suitable templates, together with finish hardware schedule to contractor, for distribution to necessary trades supplying materials to be prepped for finish hardware.

F. ELECTRONIC HARDWARE SYSTEMS

1. Provide complete wiring diagrams prepared by an authorized factory employee for each opening requiring electronic hardware, except openings where only magnetic hold-open devices are specified. Provide a copy with each hardware schedule submitted after approval.
2. Provide complete operational descriptions of electronic components listed by opening in the hardware submittals. Operational descriptions to detail how each electrical component functions within the opening incorporating all conditions of ingress and egress. Provide a copy with each hardware schedule submitted for approval.

3. Provide elevation drawings of electronic hardware and systems identifying locations of the system components with respect to their placement in the door opening. Provide a copy with each hardware schedule submitted for approval.
4. Prior to installation of electronic hardware, arrange conference between supplier, installers and related trades to review materials, procedures and coordinating related work.
5. The electrical products contained within this specification represent a complete engineered system. If alternate electrical products are submitted, it is the responsibility of the distributor to bear the cost of providing a complete and working system including re-engineering of electrical diagrams and system layout, as well as power supplies, power transfers and all required electrical components. Coordinate with electrical engineer and electrician to ensure that line voltage and low voltage wiring is coordinated to provide a complete and working system.
6. For each item of electrified hardware specified, provide ElectroLynx standardized plug connectors to accommodate up to twelve (12) wires. Plug connectors shall plug directly into ElectroLynx through-door wiring harnesses, frame wiring harnesses, electric locking devices and power supplies.

G. OPERATIONS AND MAINTENANCE MANUALS

1. Upon completion of construction and building turnover, furnish two (2) complete maintenance manuals to the City of New York. Manuals to include the following items:
 - a. Approved hardware schedule, catalog cuts and keying schedule.
 - b. Hardware installation and adjustment instructions.
 - c. Manufacturer's written warranty information.
 - d. Wiring diagrams, elevation drawings and operational descriptions for all electronic openings.

1.04 QUALITY ASSURANCE

A. LEED BUILDING - GENERAL REQUIREMENTS:

The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

B. SUBSTITUTIONS

1. Approval of products is at the discretion of the Commissioner and his hardware consultant.

C. SUPPLIER QUALIFICATIONS

1. A recognized architectural door hardware supplier who has maintained an office and has been furnishing hardware in the project's vicinity for a period of at least two (2) years.
2. Hardware supplier shall have office and warehouse facilities to accommodate this project.
3. Hardware supplier shall have in his employment at lease one (1) Architectural Hardware Consultant (AHC) who is available at reasonable times during business hours for consultation about the project's hardware and requirements to the City of New York, Commissioner and contractor.
4. Hardware supplier must be an authorized factory distributor of all products specified herein.

1.05 FIRE-RATED OPENINGS

1. Provide door hardware for fire-rated openings that comply with NFPA80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed by Underwriter's Laboratories (UL) or Warnock Hersey (WH) for use on types and sizes of doors indicated.
2. Project requires door assemblies and components that are compliant with positive pressure and S-label requirements. Specifications must be cross-referenced and coordinated with door manufacturers to ensure that total opening engineering is compatible with UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.
 - a. Certification(s) of compliance shall be made available upon request by the Authority Having Jurisdiction.

1.06 DELIVERY, STORAGE AND HANDLING

A. MARKING AND PACKAGING

1. Properly package and mark items according to the approved hardware schedule, complete with necessary screws and accessories, instructions and installation templates for spotting mortising tools. Contractor shall check deliveries against accepted list and provide receipt for them, after which he is responsible for storage and care. Any shortage or damaged good shall be made without cost to the City of New York.
2. Packaging of door hardware is the responsibility of the supplier. As hardware supplier receives material from various manufacturers, sort and clearly mark with appropriate hardware set and door numbers to match the approved hardware schedule.

B. DELIVERY

1. The supplier shall deliver all hardware to the project site; direct factory shipments are not allowed unless agreed upon beforehand. Hardware supplier shall coordinate delivery times and schedules with the contractor. Inventory door hardware jointly with representatives of hardware supplier and hardware installer/contractor until each is satisfied that count is correct.
2. No keys, other than construction master keys and/or temporary keys are to be packed in boxes with the locks.

C. STORAGE

1. Provide secure lock-up for door hardware delivered to the Project, but not yet installed. Control handling and installation of hardware items that are not immediately replaceable so that completion of work will not be delayed by hardware losses both before and after installation.

1.07 WARRANTY

- A. All items, except as noted below, shall be warranted in writing by the manufacturer against failure due to defective materials and workmanship for a minimum period of one (1) year commencing on the date of final completion and acceptance. In the event of product failure, promptly repair or replace item with no additional cost to the City of New York.
 1. Cylindrical locksets: Ten (10) years
 2. Exit Devices: Five (5) years
 3. Door closers: Ten (10) years
 4. Securitron (and approved equals) electrified hardware: Lifetime

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Only manufacturers as listed below shall be accepted. Obtain each type of finish hardware (hinges, latch and locksets, exit devices, door closers, etc.) from a single manufacturer.

2.02 MATERIALS

A. SCREWS AND FASTENERS

1. All required screws shall be supplied as necessary for securing finish hardware in the appropriate manner. Thru-bolts shall be supplied for exit devices and door closers where required by code and the appropriate blocking or reinforcing is not present in the door to preclude their use.

B. HANGING DEVICES

1. HINGES

1. Hinges shall conform to ANSI A156.1 and be five-knuckle design, ball bearing as specified with NRP (non-removable pin) feature, at all reverse bevel doors. Unless otherwise scheduled, supply one (1) hinge for every 30" of door height. Hinges shall generally be 4 ½" x 4 ½", except at doors exceeding 36" in width where 5" x 4 ½" hinges shall be provided. Heavy weight hinges (.180) shall be supplied at all high traffic doors where specified. Provide hinges with phillips flat-head screws unless specified otherwise. All exterior doors shall receive non-ferrous type hinges.

- 1) Specified Manufacturer: McKinney
- 2) Approved Substitutes: Bommer, Stanley

2. ELECTRIC HINGES

1. Provide electric hinges with ElectroLynx™ standardized plug connectors to accommodate up to twelve wires.
2. Plug connectors shall plug directly into ElectroLynx™ through-door wiring harnesses for connection to electric locking devices and power supplies.
3. Provide sufficient number of concealed wires to accommodate electric function of specified hardware.
4. Electric hinges shall be located at second hinge from bottom.
5. Provide mortar guard similar to McKinney MG-16 for each electric hinge specified.

- 1) Specified Manufacturer: McKinney QC Series
- 2) Approved Substitutes: or approved equal

3. CONTINUOUS GEARED HINGES

1. All hinges to be non-handed and completely reversible. Hinge line to be available in concealed flush mount with or without inset, full surface and half surface types as specified in the hardware sets. All hinges to be made of extruded 6060 T6 aluminum alloy with polyacetal thrust bearings, anodized after cutouts are made for bearings. All concealed hinges to be fire-rated for 20, 45 and 90 minutes when incorporated into proper door and frame labeled installations, without necessitating the use of fusible-link pins. All concealed hinges to be available in standard, heavy, and extra heavy duty weights; all full surface and half surface hinges in standard and heavy duty weights as specified in the hardware sets. All hinges to be factory cut for door size.

- 1) Specified Manufacturers: McKinney
- 2) Approved Manufacturers: Markar, or approved equal

4. CONTINUOUS STAINLESS STEEL HINGES

1. All hinges to be non-handed and of slim barrel design. Hinges to be made of type 304 stainless steel and shall have a concealed teflon-coated stainless steel pin with twin self-lubricated nylon bearings at each knuckle. Hinges shall be UL list up to and including 3 hours and shall be available with power transfer cutouts when necessary.

- 1) Specified Manufacturers: McKinney MCK-FM300
- 2) Approved Manufacturers: Markar, or approved equal

5. PIVOTS

1. All pivots shall conform to ANSI 156.4 Grade 1 and shall have oil impregnated bronze bearing in the top pivot and a radial roller and thrust bearing in the bottom pivot. The bottom pivot shall carry the full weight of the door.

- 1) Specified Manufacturer: Rixson
- 2) Acceptable Manufacturers: Approved Equal

6. FLOOR CLOSERS

1. Floor closer shall be of offset hung type and available for labeled, lead lined and regular doors. Floor closer shall have independent and adjustable valves for closing speed, latch speed, and backcheck. Floor closers shall have a built in dead stop to prevent the door from swinging beyond the opening degree and all shall be of non-hold open type unless specified otherwise. Include top and intermediate pivots per the manufacturer's recommendations.

- 1) Specified Manufacturer: Rixson
- 2) Acceptable Manufacturers: Approved Equal

C. FLUSH BOLTS AND ACCESSORIES

1. All manual and automatic flush bolts to be furnished as specified.

1. Specified Manufacturer: McKinney
2. Approved Substitutes: Burns, Trimco or approved equal

D. CYLINDERS AND KEYING

1. CYLINDERS

1. Provide cylinders and keys protected from unauthorized manufacture and distribution by manufacturer's United States patents. The key design and tolerances shall permit the cutting of keys with standard code or duplicating machines. The requirement for a single-purpose or keyway-specific cutting or duplicating machine shall not be allowed. The key design and tolerances shall permit the use of keys and cylinders in existing key systems having similar keyways and sections.

- 1) Specified Manufacturer: Sargent XC
- 2) Approved Substitutes: Corbin Russwin Pyramid, or approved equal

2. KEYING

1. All locks and cylinders shall be construction master-keyed. All locks and cylinders to be master-keyed or grandmaster-keyed as directed by the City of New York. The factory shall key all locks and cylinders. Furnish the following key amounts:
 - 1) Two (2) change keys per lock
 - 2) Three (3) grand master keys
 - 3) Six (6) master keys per master level
 - 4) Fifteen (15) construction/temporary keys
2. Master keys and all high-security or restricted keyway blanks shall be sealed in tamper-proof packaged boxes when shipped from the factory. The boxes shall be shrink wrapped and imprinted to ensure the integrity of the packaging.

3. KEY CABINET

1. Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall expansion capacity of 150% of the number of locks required for the project.
 - 1) Specified Manufacturer: Telkee
 - 2) Approved Substitutes: Lund, or approved equal

4. KEY CONTROL SOFTWARE

1. A comprehensive key management software package shall be supplied. Software package shall include free one year technical support and free upgrades to software as it becomes available. Software shall have customized query, reporting and search capability and shall allow for tracking of all issued keys. Display of key-holder photographs and signatures shall be allowed.
 - 1) Specified Manufacturers: Sargent Key Wizard
 - 2) Approved Manufacturers: Corbin Russwin, Yale, or approved equal.

E. LOCKING DEVICES

1. CYLINDRICAL LOCKSETS

1. All locksets shall be ANSI 156.2 Series, Grade 1 certified tested to two million cycles. Locksets shall be able to withstand 2400 inch pounds of torque applied to the locked

lever without gaining access. Locksets shall fit a standard 2 1/8" bore without the use of thru-bolts. Standard rose size shall be 2 3/4" diameter. Levers shall be made of solid material with no plastic fillers. Latchbolt head shall be one-piece stainless steel and must be encased within the lock body. Locksets required for fire doors shall be listed with Underwriters Laboratories for ratings of A (3 hours) label and less, UL10C positive pressure. Locksets shall have a limited seven year warranty.

- 1) Specified Manufacturer: Sargent 11 Line
- 2) Approved Substitutes: : approved equal

2. NARROW STILE DEADLOCKS

1. All locksets shall be ANSI 156.13 Series 1000 Grade 1 certified. All functions shall be manufactured in a single sized case formed from 12 gauge steel minimum. Bottom Rail Deadlocks shall have 3/8" diameter bolts.

- 1) Specified Manufacturer: Adams Rite

F. ELECTROMAGNETIC LOCKS

1. MAGNALOCKS

1. Magnalocks shall operate on 24VDC input. The lock shall not consume more than three (3) watts of power (125mA @ 24VDC). The lock shall be capable of providing a pull-apart or tensile holding force of at least 1200 pounds. The strike plate shall be mounted using a steel sex bolt and roll pin to provide a "floating" movement to assure automatic self-alignment with the lock. Anti-tamper caps shall be provided for the exposed holes. The lock and strike shall be plated to provide corrosion proofing. The lock shall be full sealed in resin to make it tamper and weather proof. The lock shall contain a suppression circuit to prevent residual magnetism and inductive kickback. The circuit also shall provide accelerated field collapse and radiation suppression. Ten feet of jacketed stranded conductor shall be provided for electrical connection.

- 1) Specified Manufacturers: Securitron Model 62
- 2) Approved Manufacturers: Locknetics, HES

G. EXIT DEVICES

1. CONVENTIONAL DEVICES

1. All exit devices shall be certified to meet ANSI/BHMA A156.3 Grade 1 requirements and shall be listed by Underwriters Laboratories and bear the UL label for life safety in full compliance with NFPA 80 and NFPA 101. Mounting rails shall be formed from a solid single piece of stainless steel, brass or bronze no less than 0.072" thick. Push rails shall be constructed of 0.062" thick material. Painted or anodized aluminum shall not be

considered heavy duty and are not acceptable. Hex key dogging shall be standard for all life safety panic hardware. Lever trim shall be available in finishes and designs to match that of the specified locksets.

- 1) Specified Manufacturer: Sargent 80 Series
- 2) Approved Substitutes: Corbin Russwin ED4000/ED5000 Series, Yale 7100/7200 Series or approved equal

2. LESS BOTTOM ROD DEVICES

1. Less bottom rod exit devices shall conform to all traditional exit device standards as specified above. Devices shall have top rod and center latching by means of a mortise lock case. Doors in pairs shall operate independently without use of coordinators or open back strikes.

- 1) Specified Manufacturer: Sargent NB 80 Series
- 2) Approved Substitutes: Corbin Russwin ED5000 Series, Yale 7100 Series, or approved equal

3. ELECTRIFIED DEVICES

1. Electrified exit devices shall conform to all traditional exit device standards as specified above. All power requirements for exit devices used must utilize a continuous circuit electric hinge for clean design and no visible means of interrupting power to device.
2. Exit devices specified in hardware sets with 59-prefix (Electroguard) feature, to provide for a momentary delay of egress. Options of this device to be specified in the hardware sets. Device to conform to NFPA 101-Special Locking Arrangements for delayed egress. Nuisance delay to be available as standard for either zero (0) or two (2) seconds. Internal latchbolt monitoring, and a standard 10-second delay for "Authorized Entry" to be standard features on every device. Delayed egress feature to be available throughout all styles and sizes of exit devices including: Panic and Fire rated Rim, Wide and Narrow Stile, Mortise, Surface Vertical Rod, and Concealed Vertical Rod.
3. All exit devices, both fire labeled and non-labeled devices, requiring remote or electric dogging shall be held in the "dogged" or open position with the rail and all latch bolts remaining fully depressed, thereby offering completely silent operation and the absence of push rail movement and noise during this energized mode.

- 1) Specified Manufacturers: Sargent 80 Series
- 2) Approved Manufacturers: Corbin Russwin ED4000/ED5000 Series, Yale 7100/7200 Series, or approved equal

4. ELECTRIFIED DEVICES

1. Electrified exit devices shall conform to all traditional exit device standards as specified above. All power requirements for exit devices used must utilize a continuous circuit electric hinge for clean design and no visible means of interrupting power to device.
2. Exit devices specified in hardware sets with 56-prefix (Latch retraction) feature, the exit device may be unlocked from a remote location by electrically dogging the push rail. This is done with a motor located in the push rail that quietly and quickly pulls in the push portion of the rail, unlocking and retracting the latches. The door then functions in a push/pull manner. Use of an electric motor in place of a solenoid allows for smooth, quiet operation ideal for low noise locations such as conference rooms, operating theaters and libraries.
3. All exit devices, both fire labeled and non-labeled devices, requiring remote or electric dogging shall be held in the "dogged" or open position with the rail and all latch bolts remaining fully depressed, thereby offering completely silent operation and the absence of push rail movement and noise during this energized mode.
 - 1) Specified Manufacturers: Sargent 80 Series
 - 2) Approved Manufacturers: Corbin Russwin ED5000 Series, Yale 7100 Series, or approved equal.

H. DOOR CLOSERS

1. SURFACE MOUNTED CLOSERS – HEAVY DUTY

1. All closers shall be ANSI/BHMA 156.4 certified and have non-ferrous covers, aluminum alloy bodies, forged steel arms, and separate valves for adjusting backcheck, closing and latching cycles and adjustable spring to provide up to 50% increase in spring power. Closers shall be constructed with a one-piece body. Closers shall be furnished with parallel arms mounting on all doors opening into corridors or other public spaces and shall be mounted to permit 180 degrees door swing wherever wall conditions permit. Furnish with non-hold open arms unless otherwise indicated. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
 - 1) Specified Manufacturer: Sargent 351 Series
 - 2) Approved Substitutes: Yale 4400 Series, Norton 7500 Series, or approved equal

2. SURFACE MOUNTED CLOSERS – UNITROL

1. All closers shall be ANSI/BHMA 156.4 certified and have field reversible door stop effective at one point selected at installation, from 90° - 115° in five-degree increments. Door stop shall be cushioned by a shock-absorbing heavy duty spring action effective at the soffit plate pivot. Closers shall be provided for parallel arm installation using rigid steel main arm and secondary arm lengths proportional to the door width. Closers shall

not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.

- 1) Specified Manufacturer: Sargent 351 Series
- 2) Approved Substitutes: Yale 4400 Series, Norton 7500 Series, or approved equal

I. DOOR TRIM AND PROTECTIVE PLATES

1. Kick plates shall be .050 gauges and two (2) inches less full width of door, or as specified. Push plates, pull plates, door pulls and miscellaneous door trim shall be as shown in the hardware schedule.

1. Specified Manufacturer: McKinney
2. Approved Substitutes: Burns, Trimco , or approved equal

J. DOOR STOPS AND HOLDERS

1. WALL MOUNTED DOOR STOPS

1. Where a door is indicated on the plans to strike flush against a wall, wall bumpers shall be provided. Provide convex or concave design as indicated.

- 1) Specified Manufacturers: McKinney
- 2) Approved Substitutes: Burns, Trimco , or approved equal

2. OVERHEAD STOPS/HOLDERS

1. Where specified, overhead stops as shown in the hardware sets are to be provided. Track, slide, arm and jamb bracket shall be constructed of extruded bronze and shock absorber spring shall be of heavy tempered steel. Overhead stops shall be of non-handed design.

- 1) Specified Manufacturers: Rixson
- 2) Approved Substitutes: Sargent, ABH, or approved equal

3. MAGNETIC HOLD-OPENS

1. Magnetic door holders shall meet or exceed ANSI A156.15 and be UL listed 228 for Door Closer and Holders, with or without integral smoke detectors. Holding force shall be 40 pounds at 24VDC and shall be fail-safe. Pushpin release that eliminates residual magnetism shall be standard.

- 1) Specified Manufacturers: Rixson
- 2) Approved Substitutes: HES, Sargent, or approved equal.

K. GASKETING AND THRESHOLDS

1. Provide continuous weatherseal on exterior doors and smoke, light, or sound seals on interior doors where indicated or scheduled. Provide intumescent seals as required to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies. Provide only those units where resilient or flexible seal strip is easily replaceable and readily available from stocks maintained by manufacturer.
2. Provide threshold units not less than 4" wide, formed to accommodate change in floor elevation where indicated, fabricated to accommodate door hardware and to fit door frames. All threshold units shall comply with the Americans with Disabilities Act (ADA.)
 1. Specified Manufacturers: Pemko
 2. Approved Substitutes: Zero, McKinney , or approved equal
 - 3.

L. SILENCERS

1. Furnish rubber door silencers equal to McKinney S1M for all new interior hollow metal frames, two (2) per pair and three (3) per single door frame, and McKinney S2W for all wood frames.

2.03 FINISHES

- A. The designations used in schedules and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18 including coordination with traditional U.S. finishes shown by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Contractor shall ensure that the building is secured and free from weather elements prior to installing interior door hardware. Examine hardware before installation to ensure it is free of defects.

3.02 INSTALLATION

- A. Mount hardware units at heights indicated in the following applicable publications, except as specifically indicated or required to comply with the governing regulations.

1. "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute (DHI.)
 2. NWWDA Industry Standard I.S.1.7, "Hardware Locations for Wood Flush Doors."
- B. All hardware shall be applied and installed in accordance with best trade practice by an experienced hardware installer. Care shall be exercised not to mar or damage adjacent work.
- C. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 9 Sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.
- D. Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.03 FIELD QUALITY CONTROL

- A. The hardware supplier shall do a final inspection prior to building completion to ensure that all hardware was correctly installed and is in proper working order.

3.04 ADJUSTING, CLEANING, AND DEMONSTRATING

- A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.
- B. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore to proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- C. Instruct City of New York's personnel in the proper adjustment and maintenance of door hardware and hardware finishes and usage of any electronic devices.

3.05 PROTECTION

- A. Contractor shall protect all hardware, as it is stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

3.06 HARDWARE SCHEDULE

12/21/2012

A. The following schedule is furnished for whatever assistance it may afford the Contractor; do not consider it as entirely inclusive. Should any particular door or item be omitted in any scheduled hardware group, provide door or item with hardware same as required for similar purposes. Quantities listed are for each pair of doors, or for each single door.

B. Manufacturer's Abbreviations:

1. MC – McKinney
2. PE - Pemko
3. RX – Rixson
4. SA – Sargent

Hardware Set # 01 – Storeroom

Doors: 410A

3	Hinges	TA2714 4 1/2 X 4 1/2 NRP	26D	MC
1	Lockset	11 28 11G04 LL	26D	SA
1	Overhead Stop	OH Stop Rixson 10 Series - Size to suit door width	630	RX
3	Door Silencers	S1M		MC

Hardware Set #02- NightLatch Exit Device

Doors: E3, E4

3	Hinges	TA2314 4 1/2 X 4 1/2	32D	MC
1	Exit Device	11 12 43 8804 F ETL	32D	SA
1	Closer	351 UO	EN	SA
1	Smoke Seal	S88 BL 17'		PE
1	Door Sweep	345 ANB 36"		PE
1	Threshold	272 A 36" PEMKOTE		PE

Hardware Set #02A- Electrified Classroom Device

Doors: E2

2	Continuous Hinge	MCK-FM300 7'0" EL-12 SECURITY STUDS	32D	MC
2	Exit Device	11 12 43 55 56 8710 F 313 X 863	32D	SA
2	Closer	351 CPS	EN	SA
2	ElectroLynx Harness	QC-C1500P		MC
2	ElectroLynx Harness	QC-C003		MC
2	Smoke Seal	S88 BL 25'		PE
1	Door Sweep	345 ANB 36"		PE
1	Threshold	272 A 72"		PE

Bronx River Art Center
Bronx, New York

Finish Hardware
087100 - 16

Note: Note: Visitors to be indentified via intercom being supplied by others. Upon approval of ingress, panic devices are to be remotely activated and allow passage into the building. Push buzzer is to be provided by others.

Hardware Set #02B- Classroom Exit Device

Doors: E5

1	Continuous Hinge	MCK-FM300 7'0" SECURITY STUDS	32D	MC
1	Exit Device	11 12 43 8813 G E T L	32D	SA
1	Closer	351 CPSH	EN	SA
1	Specialty Bottom	3185 AV 53"		PE
1	Gasketing	S773GR		PE
1	Adjustable Jamb Weather stripping	350CSPK 1-4'-5" x 2/7'-0"		PE

Note: See Section 142120

Hardware Set #03-Classroom Exit Device

Doors: 102A, 201C, 301A, 401A

3	Hinges	TA2714 4 1/2 X 4 1/2 NRP	26D	MC
1	Exit Device	11 12 43 8813 F ETL	32D	SA
1	Closer	351 UO	EN	SA
1	Dome Stop	FS01	US26D	MC
1	Smoke Seal	S88 BL 17'		PE

Hardware Set #04- Passage Exit Device

Doors: 206A, 301B, 408A

3	Hinges	TA2714 4 1/2 X 4 1/2	26D	MC
1	Exit Device	12 43 8815 F ETL	32D	SA
1	Closer	351 UO	EN	SA
1	Dome Stop	FS01	US26D	MC
1	Smoke Seal	S88 BL 17'		PE

Hardware Set #05-Classroom Exit Device

Doors: 201D

3	Hinges	TA2714 4 1/2 X 4 1/2 NRP	26D	MC
1	Exit Device	11 12 43 8813 F ETL	32D	SA

Bronx River Art Center
Bronx, New York

Finish Hardware
087100 - 17

1	Closer	351 CPS	EN	SA
1	Kickplate	KP50 8" x 34" B3E	US32D	MC
1	Smoke Seal	S88 BL 17'		PE

Hardware Set #06- Passage

Doors: 103A, 104A, 205B

3	Hinges	TA2714 4 1/2 X 4 1/2 NRP	26D	MC
1	Passage Set	28 SG 11U15 LL	26D	SA
1	Closer	351 UO	EN	SA
1	Wall Stop	WS02	US26D	MC
3	Door Silencers	S1M		MC

Hardware Set # 07 – Classroom Exit Device

Doors: 101A

2	Continuous Hinge	MCK-FM300 7'0" SECURITY STUDS	32D	MC
2	Exit Device	11 12 43 8713 F ETL	32D	SA
2	Closer	351 CPS	EN	SA
2	Kickplate	KP50 8" x 35" B3E	US32D	MC
1	Smoke Seal	S88 BL 25'		PE

Hardware Set# 08- Not Used

Hardware Set#09- Office Lock

Doors: 203A

3	Hinges	TA2714 4 1/2 X 4 1/2	26D	MC
1	Lockset	11 28 11G05 LL	26D	SA
1	Closer	351 UO	EN	SA
1	Wall Stop	WS02	US26D	MC
3	Door Silencers	S1M		MC

Hardware Set #10- Classroom Exit Device

Doors: 201A, 201B

Bronx River Art Center
Bronx, New York

Finish Hardware
087100 - 18

6	Hinges	TA2714 4 1/2 X 4 1/2 NRP	26D	MC
2	Exit Device	11 12 NB MD 8613 F ETL	32D	SA
2	Closer	351 CPS	EN	SA
2	Kickplate	KP50 8" x 35" B3E	US32D	MC
1	Smoke Seal	S88 BL 25'		PE

Hardware Set# 11- Night Latch Exit Device

Doors: 110A, 111A

3	Hinges	TA2714 4 1/2 X 4 1/2 NRP	26D	MC
1	Exit Device	11 12 43 8806 F ETL	32D	SA
1	Closer	351 CPS	EN	SA
1	Kickplate	KP50 8" x 34" B3E	US32D	MC
1	Smoke Seal	S88 BL 17'		PE

Hardware Set#12- Storeroom Lock

Doors: 107A

6	Hinges	TA2714 4 1/2 X 4 1/2 NRP	26D	MC
2	Flush Bolt	FB01M-12	US26D	MC
1	Lockset	11 28-118 11G04 LL	26D	SA
2	Closer	351 CPS	EN	SA
1	Dust Proof Strike	DPS3	US26D	MC
2	Door Silencers	S1M		MC

Hardware Set#13 Pocket or Sliding Door Sets

Doors: 105A, 105B, 109A, 202A, 202B, 210A, 404A, 405A

Note: ALL HARDWARE BY DOOR FABRICATOR

Hardware Set#14- Storeroom Lock

Doors: 203B

6	Hinges	TA2714 4 1/2 X 4 1/2 NRP	26D	MC
---	--------	--------------------------	-----	----

Bronx River Art Center
Bronx, New York

Finish Hardware
087100 - 19

2	Flush Bolt	FB01M-12	US26D	MC
1	Lockset	11 28 11G04 LL	26D	SA
1	Closer	351 CPS	EN	SA
1	Dust Proof Strike	DPS3	US26D	MC
1	Smoke Seal	S88 BL 25'		PE

Hardware Set #15- Classroom Lock

Doors: 108A, 207A

3	Hinges	TA2714 4 1/2 X 4 1/2	26D	MC
1	Lockset	11 28 11G37 LL	26D	SA
1	Kickplate	KP50 8" x 34" B3E	US32D	MC
1	Wall Stop	WS02	US26D	MC
3	Door Silencers	S1M		MC

Hardware Set#16 – Privacy

Doors: 113A, 308A, 409A, 411A

3	Hinges	TA2714 4 1/2 X 4 1/2	26D	MC
1	Privacy Set	28 SG 11U65 LL	26D	SA
1	Closer	351 UO	EN	SA
1	Kickplate	KP50 8" x 34" B3E	US32D	MC
1	Wall Stop	WS02	US26D	MC
3	Door Silencers	S1M		MC

Hardware Set#17- Storeroom Lock

Doors: 501A

3	Hinges	TA2314 4 1/2 X 4 1/2 NRP	32D	MC
1	Lockset	11 28 11G04 LL	26D	SA
1	Closer	351 CPS	EN	SA
1	Weatherstrip	285 CR 1 x 36" 2 x 84"		PE
1	Door Sweep	345 ANB 36"		PE
1	Threshold	272 A 36" PEMKOTE		PE

Hardware Set#18- Exit only Device- No outside trim

Bronx River Art Center
Bronx, New York

Finish Hardware
087100 - 20

Doors: E1

1	Continuous Hinge	MCK-FM300 7'0" SECURITY STUDS	32D	MC
1	Exit Device	12 43 8810 F	32D	SA
1	Closer	351 CPS	EN	SA
1	Smoke Seal	S88 BL 17'		PE
1	Door Sweep	345 ANB 36"		PE
1	Threshold	272 A 36" PEMKOTE		PE

Hardware Set#19- Classroom Lock

Doors: 204A

3	Hinges	TA2714 4 1/2 X 4 1/2 NRP	26D	MC
1	Lockset	11 28 11G37 LL	26D	SA
1	Overhead Stop	OH Stop Rixson 10 Series - Size to suit door width	630	RX
3	Door Silencers	S1M		MC

Hardware Set#20 - Privacy

Doors: 208A, 209A, 211A

3	Hinges	TA2714 4 1/2 X 4 1/2 NRP	26D	MC
1	Privacy Set	28 SG 11U65 LL	26D	SA
1	Closer	351 CPS	EN	SA
1	Kickplate	KP50 8" x 34" B3E	US32D	MC
3	Door Silencers	S1M		MC

Hardware Set #21 Storeroom Lock

Doors: 203C

6	Hinges	TA2714 4 1/2 X 4 1/2 NRP	26D	MC
2	Flush Bolt	FB01M-12	US26D	MC
1	Lockset	11 28 11G04 LL	26D	SA
2	Overhead Stop	OH Stop Rixson 10 Series - Size to suit door width	630	RX
1	Dust Proof Strike	DPS3	US26D	MC
2	Door Silencers	S1M		MC

Hardware Set #22- Not Used

Hardware Set #23- Classroom Exit Device

Doors: 106A

3	Hinges	TA2714 4 1/2 X 4 1/2 NRP	26D	MC
1	Exit Device	11 12 43 8813 F ETL	32D	SA
1	Closer	351 CPS	EN	SA
1	Kickplate	KP50 8" x 34" B3E	US32D	MC
1	Smoke Seal	S88 BL 17'		PE

Hardware Set# 24- Classroom Lock

Doors: 205A

3	Hinges	TA2714 4 1/2 X 4 1/2	26D	MC
1	Lockset	11 28 11G37 LL	26D	SA
1	Kickplate	KP50 8" x 34" B3E	US32D	MC
1	Wall Stop	WS02	US26D	MC
1	Weatherstrip	285 CR 1 x 36" 2 x 84"		PE
1	Auto Door Bottom	434 ANBL 36"		PE
1	Threshold	2006 AT 36"		PE

Note: Dark room

Hardware Set #25- Cylinder Operated Flush Bolt

Doors: 107B, 107C

1	Cylinder Operated Flush Bolt	1877	628	AD
1	Mortise Cylinder	11 41 13-0512	26D	SA
1	Wall Mounted Sliding Door Kit	280SWTKIT/12		HEND

Hardware Set #26 – Cylinder Operated Flush Bolt

Doors: 107D

1	Cylinder Operated Flush Bolt	1877	628	AD
1	Mortise Cylinder	11 41 13-0512	26D	SA
1	SIDE WALL TRACK SYSTEM	280SWTKIT/8		HEND

Bronx River Art Center
Bronx, New York

Finish Hardware
087100 - 22

Hardware Set#27- Office Lock

Doors: 52, 53, 54

1	Continuous Hinge	MCK-FM300 7'0" SECURITY STUDS	32D	MC
1	Lockset	11 28 11G05 LL	26D	SA
1	Wall Stop	WS02	US26D	MC
3	Door Silencers	S1M		MC

Hardware Set #AL1- Night Latch Exit Device

Doors: 02, 04

2	Continuous Hinge	MCK-FM300 8'0" SECURITY STUDS	32D	MC
2	Exit Device	11 43 AD 8410 F 113 X 863 640 96"	32D	SA
2	Closer	351 CPS	EN	SA
2	Drop Plate	351-D	EN	SA

Note: Balance of hardware by alum/glass door mfg.

Hardware Set # E-AL2- Electrified Night Latch Exit Device

Doors: 06

2	Continuous Hinge	MCK-FM300 8'0" EL-8 SECURITY STUDS	32D	MC
2	Exit Device	11 43 55 56 AD 8410 F 106 X 863 640 96"	32D	SA
2	Closer	351 CPS	EN	SA
2	Drop Plate	351-D	EN	SA

Note: Note: Visitors to be indentified via intercom being supplied by others. Upon approval of ingress, panic devices are to be remotely activated and allow passage into the building. Push buzzer is to be provided by others. Balance of hardware by alum/glass door mfg.

Hardware Set #AL3- Office Lock

Doors: 57, 58, 60, 61, 62

3	Hinges	T4A3786 5 X 4 1/2	26D	MC
1	Lockset	11 28 11G05 LL	26D	SA

Bronx River Art Center
Bronx, New York

Finish Hardware
087100 - 23

1	Closer	351 UO	EN	SA
1	Drop Plate	351-D	EN	SA
1	Overhead Stop	OH Stop Rixson Series - to suit door width	630	RX
3	Door Silencers	S1M		MC

Hardware Set# AL4-Office Lock

Doors: 59

6	Hinges	T4A3786 5 X 4 1/2	26D	MC
2	Flush Bolt	FB01M-12	US26D	MC
1	Lockset	11 28-118 11G05 LL	26D	SA
1	Closer	351 UO	EN	SA
2	Overhead Stop	OH Stop Rixson 10 Series - Size to suit door width	630	RX
1	Dust Proof Strike	DPS3	US26D	MC
2	Door Silencers	S1M		MC

End of Section 087100

SECTION 088000

GLASS & GLAZING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the glass and glazing as shown on the drawings and/or specified herein, including but not limited to glazing of the following:
 - 1. Windows as part of Alternate 3.
 - 2. Storefront and doors
 - 3. Interior borrowed lites
 - 4. Vision panels at doors
 - 5. Mirrors at bathrooms

1.3 RELATED SECTIONS

- A. Construction Waste Management And Disposal – Section 017419
- B. Sustainable Design Requirements (LEED Building) – Section 018113
- C. Volatile Organic Compound (Voc) Limits For Adhesives, Sealants, Paints And Coatings – Section 018113.3
- D. Construction IAQ Requirements – Section 018119

- E. Rough Carpentry - Section 061000.
- F. Joints and Sealers Section 079200
- G. Hollow metal doors and frames - Section 081113.
- H. Aluminum Entrances and Storefront – Section 084113
- I. Aluminum Windows – Section 085113
- J. Gypsum Drywall - Section 092500.
- K. Painting and Finishing- Section 099000.
- L. Associated work and/or coordination in Divisions 21-23, 26-28

1.4 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Glass Design: Glass thicknesses indicated on drawings and/or specified herein are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:
 - 1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
 - a. Specified Design Wind Loads: 30 psf or greater if required by Code.
 - 2. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
 - a. Load Duration: 60 seconds or less.
 - 3. Maximum Lateral Deflection: For glass supported on all four edges, provide thickness required that limits center deflection at design wind pressure to 1/100 times the short side length or 3/4", whichever is less.
 - 4. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

- a. Temperature Change (Range): 120 deg. F ambient; 180 deg F, material surfaces.
- C. Glass units shall be annealed, heat strengthened, fully tempered or laminated where required to meet wind load and safety glazing requirements, as shown, specified or recommended by the glass fabricator and as required by the prevailing Building Code.

1.5 SUBMITTALS

A. LEED BUILDING Submittal Requirements:

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications.
2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION
4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the LEED Consultant for review.

B. Product Data: Submit manufacturer's printed product data, specifications, standard details, installation instructions, use limitations and recommendations for each material used. Provide certifications that materials and systems comply with specified requirements.

C. Initial Selection Samples: Submit samples of each glass and glazing material showing complete range of colors, textures, and finishes available for each material used.

1. Submit complete range of samples of standard colors and patterns for ceramic frits at insulating glass.
2. Submit complete range of samples of sandblasted glass showing variations of grits and opacity achieved.

- C. Verification Samples: Submit representative samples of each glass and glazing material that is to be exposed in completed work. Show full color ranges and finish variations expected. Provide glass samples having minimum size of 144 sq. in. and 6 in. long samples of sealants and glazing materials; all samples shall bear the name of the manufacturer, brand name, thickness, and quality.
- D. Calculations: Provide wind load charts, calculations and certification of performance of this work. Indicate how design requirements for loading and other performance criteria have been satisfied.
- E. Test Reports: Provide certified reports for specified tests.
- F. Warranties: Provide written warranties as specified herein.

1.6 QUALITY ASSURANCE

- A. Source: For each glass and glazing type required for work of this Section, provide primary materials which are products of one manufacturer. Provide secondary or accessory materials which are acceptable to manufacturers of primary materials.
- B. Installer: A firm with a minimum of three years experience in type of work required by this Section and which is acceptable to manufacturers of primary materials; and with a successful record of in-service installations similar in size and scope to this Project.
- C. Glass Thickness: Glass thicknesses shown on drawings and/or specified herein are minimum thicknesses. Determine and provide size and thickness of glass products that are certified to meet or exceed performance requirements specified in this Section. Provide units with proper thickness, edge clearance and tolerance to comply with recommendations of glass manufacturer.
- D. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated.
 - 1. GANA Publications: GANA'S "Glazing Manual" and "Laminated Glass Design Guide".
 - 2. SIGMA Publications: SIGMA TM-3000, "Vertical Glazing Guidelines for Sealed Insulating Glass Units".
- E. Glazing for Fire-Rated Door Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.
- F. Glazing for Fire-Rated Window Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.

- G. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201 and, for wired glass, ANSI 97.1.
1. Subject to compliance with requirements, obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council.
 2. Where glazing units, including Kind FT glass and laminated glass, are specified in Part 2 articles for glazing lites more than 9 sq. ft. in exposed surface area of one side, provide glazing products that comply with Category II materials, for lites 9 sq. ft. or less in exposed surface area of one side, provide glazing products that comply with Category I or II materials, except for hazardous locations where Category II materials are required by 16 CFR 1201 and regulations of authorities having jurisdiction.
- H. Insulating Glass Certification Program: Permanently marked on spacers with appropriate certification label of the following testing and inspecting agency:
1. Insulating Glass Certification Council.
 2. Associated Laboratories, Inc.

1.7 TESTS

- A. Preconstruction Sealant Test: Submit samples of materials to be used to glazing sealant manufacturer to determine sealant compatibility. Include samples of glass, gaskets, glazing materials, framing members, and other components and accessories of glazing work. Test in accordance with ASTM C 794 to verify what type of primers (if any) are required to ensure sealant adhesion to substrates.
1. Submit minimum of nine pieces of each type and finish of framing member, and nine pieces of each type, class, kind, condition, and form of glass, including monolithic, laminated, and insulating glass for adhesion tests.
 2. Provide manufacturer's written report and recommendations regarding proper installation.

1.8 PROJECT CONDITIONS

- A. Weather: Perform work of this Section only when existing or forecasted weather conditions are within limits established by manufacturers of materials and products used.
- B. Temperature Limits: Install sealants only when temperatures are within limits recommended by sealant manufacturer, except, never install sealants when temperatures are below 40 deg. F.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials and products in unopened, factory labeled packages. Store and handle in strict compliance with manufacturer's instructions and recommendations and GANA Manual.
 - 1. Protect materials from moisture, sunlight, excess heat, sparks and flame.
 - 2. Sequence deliveries to avoid delays, but minimize on-site storage.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS/FABRICATORS

- A. All glass and glazing used at the exterior of the Project shall be manufactured by the same manufacturer. The same manufacturer and the same furnace shall be used for all tempered and heat strengthened glass used throughout the project.

2.2 GLASS MATERIAL TYPES AND PRODUCTS

- A. Clear Float Glass: ASTM C 1036, Type I-Transparent, Flat, Class 1-Clear, Quality q3, minimum 1/4" thick.
- B. Clear Tempered Glass: ASTM C1048, Condition A-Uncoated, Type I-Transparent, Flat, Class 1-Clear, Quality q3, Kind FT, minimum 1/4" thick.
- C. Low 'E' Coated Glass: Provide high-performance, clear, metallic coating, Solarban 60, as manufactured by PPG, VE1-2M Viracon, TriStar Glass Products, or approved equal. Provide Low 'E' coating which has the following performance characteristics when applied to the No. 2 surface of 1 in. insulating units, both lites 1/4 in. clear:
 - 1. Visible Light Transmittance: 70%.
 - 2. Shading Coefficient: 0.43.
 - 3. Solar Energy Transmittance: 32%.
- D. Laminated Safety Glass: Provide two glass panes of equal thickness, laminated together with a polyvinyl butyl interlayer, conform to ASTM C1172, and as follows:
 - 1. Interlayer Color: Clear.
 - 2. Interlayer Material: Provide Monsanto "Saflex" or DuPont "Butacite", Viracon "Solarscreen VH" or approved equal 0.030 in. thick at vertical applications, and 0.060 in. thick at sloped or horizontal applications.
 - 3. Minimum thickness of 1/4".

- E. Insulating Glass: Provide factory assembled units of organically sealed panes of glass enclosing a hermetically sealed dehydrated air space, complying with ASTM E-774-97, and as follows:
1. Sealing System: Dual Seal.
 2. Primary Sealant: Polyisobutylene.
 3. Secondary Sealant: Silicone, General Electric IGS 3204 or IGS 3100, Rhodorsil Rhodotherm 542 or 543, or Dow Corning 982 or approved equal.
 4. Spacer: Clear finish aluminum with welded, soldered, or bent corners.
 5. Desiccant: Molecular sieve, silica gel, or blend of both.
 6. Air Space Thickness: 1/2 in.
 7. Glass Thickness: 1/4" minimum.
- F. Wire Glass: ASTM C 1036, UL Listed, Fire Rated polished transparent wire glass complying with ANSI Z97.1. Provide Type II - Patterned and Wired Glass, Class 1 - Clear, Quality q8 - Glazing, Form 1 - Polished Both Sides, and as follows:
1. Thickness: 1/4 in. unless otherwise indicated or required.
 2. Square Pattern: Mesh M2.
- G. Frameless Mirrors: 1/4 in., Quality q2, clear float glass with silver, copper, and organic coating, and as follows:
1. Edges: Uniformly ground and polished.

2.3 GLAZING MATERIALS AND PRODUCTS

- A. General: Provide sealants and gaskets with performance characteristics suitable for applications indicated. Ensure compatibility of glazing sealants with insulated glass sealants, with laminated glass interlayers, and with any other surfaces in contact.
- B. General Glazing and Cap Bead Sealant: Provide sealant with maximum Shore A hardness of 50. Provide one of the following:
1. Dow Corning 795.
 2. General Electric Silglaze N 2500 or Contractors SCS-1000.
 3. Rhodorsil 3B, 5C, or 6B.
 4. Tremco Spectrem 2.
 5. Or approved equal.

- C. Weather Seal Sealant: Provide non-acid curing sealant with movement range $\pm 50\%$, ASTM C 719. Provide one of the following:
1. Dow Corning 795.
 2. General Electric Silpruf.
 3. Rhodorsil 3B, 5C, or 6B.
 4. Tremco Spectrem 2.
 5. Or approved equal.
- D. Dense Elastomeric Compression Seal Gaskets: Provide molded or extruded neoprene or EPDM gaskets, Shore A hardness of 75 ± 5 for hollow profile, and 60 ± 5 for solid profiles, ASTM C 864.
- E. Cellular, Elastomeric Preformed Gaskets: Provide extruded or molded closed cell, integral-skinned neoprene, Shore A 40 ± 5 , and 20% to 35% compression, ASTM C-509; Type II.
- F. Preformed Glazing Tape: Provide solvent-free butyl-polyisobutylene rubber with 100% solids content complying with ASTM C1281 AAMA A 800 with integral continuous EPDM shim. Provide preformed glazing tape in extruded tape form. Provide Tremco "Polyshim II" or approved equal.
- G. Setting Blocks: Provide neoprene or silicone blocks with Shore A hardness of 80-90. Provide products certified by manufacturer to be compatible with silicone sealants. Length to be not less than 4". Width for setting blocks to be 1/16" more than glass thickness and high enough to provide the lite recommended by glass manufacturer. When thickness of setting block exceeds 3/4" the glass manufacturer must be consulted for sizes and configuration. In a vented system, setting block shall be designed so as to not restrict the flow of water within the glazing rabbet to the weep holes.
1. Shims: For shims used with setting blocks, provide same materials, hardness, length and width as setting blocks.
 2. Structural Silicone Glazing: Provide silicone setting blocks where structural silicone occurs at sills and at insulated units with silicone edge seals.
- H. Edge Blocks: Provide neoprene or silicone as required for compatibility with glazing sealants. Provide blocks with Shore A hardness of 55 ± 5 .
- I. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place.
- J. Miscellaneous Glazing Materials: Provide sealant backer rods, primers, cleaners, and sealers of type recommended by glass and sealant manufacturers.

2.4 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

- A. Fabricate glass and other glazing products in sizes required to glaze 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 standard, to comply with system performance requirements.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with indoor and outdoor faces.
- C. Grind smooth and polish exposed glass edges.

PART 3 EXECUTION

A. EXAMINATION

- A. Examine framing 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. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

B. PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

C. 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. Glazing channel dimensions, as indicated on Shop Drawings, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- 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 sealant-substrate 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 the length plus width is larger than 50 inches as follows:
 - 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 according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- 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 by gasket manufacturer.
- L. Flush Glazing
 - 1. If the butt joint in the metal framing is in the vertical direction, the glazier shall run the tape initially on the head and sill members going directly over this joint. Should the butt joint in the metal framing run horizontally, tapes must first be applied to the jambs so that it crosses over the joint.
 - 2. Each tape section shall butt the adjoining tape and be united with a tool to eliminate any opening.
 - 3. Do not overlap the adjoining length of tape or rubber shim as this will prevent full contact around the perimeter of glass.

M. Off-Set Glazing

1. Where the glazing legs are off-set, the difference in the rabbet width shall be compensated by employing different glazing tapes with different diameter shims. The difference in shim shall be equal to the size of the off-set. The thinner tape shall be positioned first on the glazing leg closest to the interior. The thicker tape shall be cut to the exact length of the dimension between the applied tapes, and installed on the outermost glazing leg.
2. Immediately prior to setting glass, paper backing shall be removed. Apply a toe bead of sealant 6" in each direction, from each corner.
3. Locate setting blocks in the sill member at quarter points, or if necessary to within 6" of each corner. Setting blocks must be set equal distance from center line of the glass and high enough to provide the recommended bite and edge clearances.
4. Set edge block according to glass manufacturer's recommendations.
5. Set Glass: The glass shall be pressed firmly against the tape to achieve full contact.
6. In a vented system, apply a heel bead (air seal) of sealant around the perimeter of glass, between the sole of the I.G. unit and the base of the rabbet of the metal framing developing a positive bond to the unit and to the metal framing. The bead of the sealant shall be deep enough so that it will partially fill the channel to a depth of 1/4" between the glass edge and the base of the metal framing rabbet.
7. Interior stops shall be set, and glazing tape spline for the appropriate face clearance shall be rolled into place, compressing the glass to the shim within the glazing tape.

D. 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. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these 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 as recommended by glass manufacturer or glass frame manufacturer.

- 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 where noted on approved shop drawings.
- E. GASKET GLAZING (DRY)
 - A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance 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. 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 by gasket manufacturer.
 - D. Install gaskets so they protrude past face of glazing stops.
- F. 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.
- G. PROTECTION AND CLEANING
 - A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
 - B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.

- C. 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 build-up of dirt, scum, alkaline deposits, or stains; remove as recommended by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents, and vandalism, during construction period.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 088400

PLASTIC GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SUMMARY

- A. Section Includes:
 - 1. Multiwalled structured polycarbonate glazing.
- B. Related Sections:
 - 1. Retain Sections in subparagraphs below that contain requirements Contractor might expect to find in this Section but are specified in other Sections.
 - 2. Construction Waste Management and Disposal - Section 017419
 - 3. Sustainable Design Requirements (LEED Building) - Section 018113
 - 4. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3
 - 5. Construction IAQ Requirements - Section 018119

1.3 PERFORMANCE REQUIREMENTS

- A. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

- B. Provide plastic glazing sheets and glazing materials capable of withstanding normal temperature changes, wind, and impact loads without failure, including loss or breakage of plastic sheets attributable to the following: failure of sealants or gaskets to remain watertight and airtight, deterioration of plastic sheet and glazing materials, or other defects in materials and installation.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on plastic glazing and glazing framing members.

- 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED BUILDING Submittal Requirements:

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

- 1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Sustainable Design Requirements (LEED Building) - Section 018113 of these specifications.
 - 2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
 - 3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
 - 4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
 - 5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the LEED Consultant for review.
- C. Plastic Glazing Samples: For each color and finish of plastic glazing indicated, 12 inches square and of same thickness indicated for final Work.
- D. Glazing Accessory Samples: For gaskets and sealants, in 12-inch lengths.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For installers.
- B. Product Certificates: For plastic glazing and glazing products, from manufacturer.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for plastic glazing glazing sealants and glazing gaskets.
- D. Preconstruction adhesion and compatibility test report.
- E. Research/Evaluation Reports: For plastic glazing.
- F. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For plastic glazing to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Glazing Publication: Comply with published recommendations of plastic glazing manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated. Refer to this publication for definitions of glazing terms not otherwise defined in this Section or in other referenced standards.
- 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. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Install plastic glazing in mockups to match plastic glazing systems required for Project.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect plastic glazing materials according to manufacturer's written instructions. Prevent damage to plastic glazing and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Maintain protective coverings on plastic glazing to avoid exposures to abrasive substances, excessive heat, and other sources of possible deterioration.

1.9 PROJECT 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.

1.10 COORDINATION

- A. Coordinate dimensions of plastic glazing with dimensions of construction that receives plastic glazing to ensure that glazing channels provide adequate face and edge clearance, bite, and allowance for expansion.

1.11 WARRANTY

- A. Manufacturer's Special Warranty for Abrasion- and UV-Resistant, Multiwalled Structured Polycarbonate: Manufacturer's standard form, made out to City of New York and signed by polycarbonate manufacturer, in which manufacturer agrees to replace polycarbonate products that break or develop defects from normal use that are attributable to manufacturing process and not to practices for maintaining and cleaning plastic glazing contrary to manufacturer's written instructions. Defects include coating delamination, haze, excessive yellowing, and loss of light transmission beyond the limits stated in plastic glazing manufacturer's standard form.

1. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PLASTIC GLAZING, GENERAL

- A. Sizes: Fabricate plastic glazing to sizes required for openings indicated. Allow for thermal expansion and contraction of plastic glazing without restraint and without withdrawal of edges from frames, with edge clearances and tolerances complying with plastic glazing manufacturer's written instructions.
- B. Fire-Test-Response Characteristics of Plastic Glazing: As determined by testing plastic glazing by a qualified testing agency acceptable to authorities having jurisdiction.
1. Self-ignition temperature of 650 deg F or higher when tested according to ASTM D 1929 on plastic sheets in thicknesses indicated for the Work.
 2. Smoke-developed index of 450 or less when tested according to ASTM E 84, or smoke density of 75 or less when tested according to ASTM D 2843 on plastic sheets in thicknesses indicated for the Work.
 3. Burning extent of 1 inch or less when tested according to ASTM D 635 at a nominal thickness of 0.060 inch or thickness indicated for the Work.
 4. Burning rate of 2.5 in./min. or less when tested according to ASTM D 635 at a nominal thickness of 0.060 inch or thickness indicated for the Work, where Class CC2 is indicated.
 5. Flame-spread index not less than that indicated when tested according to ASTM E 84.

- C. Windborne-Debris-Impact Resistance: Provide exterior plastic glazing that passes basic-protection testing requirements in ASTM E 1996 for Wind Zone 2 when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than plastic glazing indicated for use on Project and shall be installed in same manner as indicated for use on Project.

1. Large-Missile Test: For plastic glazing located within 30 feet of grade.
2. Small-Missile Test: For plastic glazing located more than 30 feet above grade.
3. Large-Missile Test: For all plastic glazing, regardless of height above grade.

2.2 MULTIWALLED STRUCTURED POLYCARBONATE GLAZING

- A. Multiwalled Structured Polycarbonate Sheet: Manufacturer's standard polycarbonate extruded shape with smooth, flat exterior surfaces and internal ribbing.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Gallina USA LLC; arcoPlus 613 Velario.
 - b. Amerilux International, LLC; Coverlite Multiwall Polycarbonate .
 - c. Co-Ex Corporation; Macrolux .
2. Nominal Thickness: 3/8 inch.
3. Color: Transparent colorless.
4. Combustibility Class: CC2.
5. Flame-Spread Index: 25 or less.

2.3 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets, EPDM, ASTM C 864; and of profile and hardness required to maintain watertight seal.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned EPDM gaskets complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal.

2.4 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 glass manufacturers for application indicated; and complying with ASTM C 1281 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.

- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
 - 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
 - 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.5 MISCELLANEOUS GLAZING MATERIALS

- A. Compatibility: Provide products of material, size, and shape complying with requirements of manufacturers of plastic 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: EPDM or silicone as required for compatibility with glazing sealant and plastic glazing, and of hardness recommended by plastic glazing manufacturer for application indicated.
- D. Compressible Filler Rods: Closed cell of waterproof-jacketed rod stock of synthetic rubber or plastic foam, flexible and resilient, with 5- to 10-psi compression strength for 25 percent deflection.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine plastic glazing framing, with glazing Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Minimum required face or edge clearances.
 - 3. Effective sealing between joints of plastic glazing framing members.
- B. Proceed with glazing only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members immediately before glazing. Remove coatings not firmly bonded to substrates. Remove lacquer from metal surfaces where elastomeric sealants are indicated for use.

3.3 PROTECTING AND CLEANING

- A. Protect plastic glazing from contact with contaminating substances from construction operations. If, despite such protection, contaminating substances do come into contact with plastic glazing, remove immediately and wash plastic glazing according to plastic glazing manufacturer's written instructions.
- B. Remove and replace plastic glazing that is broken, chipped, cracked, abraded, or damaged in other ways during construction period, including natural causes, accidents, and vandalism.
- C. Wash plastic glazing on both faces before date scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Wash plastic glazing according to plastic glazing manufacturer's written instructions.

END OF SECTION 088400

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 089000

LOUVERS AND VENTS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SECTION INCLUDES

- A. The Work of this Section includes all labor, materials, equipment and services necessary to complete the aluminum louvers as shown on the drawings and/or specified herein, including but not necessarily limited to the following:
 - 1. Aluminum louvers.
 - 2. Blank off panels.

1.3 RELATED SECTIONS

- 1. Construction Waste Management And Disposal - Section 017419
- 2. Sustainable Design Requirements (LEED Building) - Section 018113
- 3. Volatile Organic Compound (VOC Limits For Adhesives, Sealants, Paints And Coatings - Section 018113.3
- 4. Construction IAQ Requirements – Section 018119
- 5. Unit Masonry - Section 042000
- 6. Sealant work - Section 079200

7. Louvers in metal doors - Section 081000.
8. Louvers connected to ductwork – Divisions 21-23
9. Schedule as shown on Drawings

1.4 QUALITY ASSURANCE

A LEED BUILDING - GENERAL REQUIREMENTS:

The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

B. Performance Requirements

1. Structural Performance: Provide exterior metal louvers capable of withstanding the effects of loads and stresses from wind and normal thermal movement without evidencing permanent deformation of louver components including blades, frames, and supports; noise or metal fatigue caused by louver blade rattle or flutter or permanent damage to fasteners and anchors.
 - a. Wind Load: Uniform pressure (velocity pressure) of 30 lbf/sq. ft., acting inward or outward.
2. Thermal Movements: Provide louvers that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, and other detrimental effects.
 - a. Temperature Change (Range): 120 deg. F., ambient; 180 deg. F, material surfaces.
3. Louver shall be rated for less than 0.15" pressure drop on intake and less than 0.3 ounces per square foot water penetration at 800 FPM free area velocity. Louver shall be rated by AMCA and bear their label.

C. Comply with SMACNA "Architectural Sheet Metal Manual" recommendations for fabrication, construction details and installation procedures, except as otherwise indicated.

- D. Field Measurements: Verify size, location and placement of louver units prior to fabrication.
- E. Shop Assembly: Coordinate field measurements and shop drawings with fabrication and shop assembly to minimize field adjustments, splicing, mechanical joints and field assembly of units. Preassemble units in shop to greatest extent possible and disassemble as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

1.5 SUBMITTALS

A. LEED BUILDING Submittal Requirements:

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications.
2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION
4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the LEED Consultant for review.

- A. Product Data: Submit manufacturer's specifications, certified test data, where applicable, and installation instructions for required products, including finishes.
- B. Shop Drawings: Submit shop drawings for fabrication and erection of louver units and accessories. Include plans, elevations and details of sections and connections to adjoining work. Indicate materials, finishes, fasteners, joinery and other information to determine compliance with specified requirements.
- C. Samples: Submit six (6) inch square samples of each required finish. Prepare samples on metal of same gauge and alloy to be used in work. Where normal color and texture

variations are to be expected, include two (2) or more units in each sample showing limits of such variations.

1.6 PRODUCT HANDLING

- A. Protection: Use all means necessary to protect the materials of this Section before, during and after installation and to protect the installed work and materials of all other trades.
- B. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

PART 2 PRODUCTS

2.1 LOUVER MATERIAL

- A. Provide storm resistant extruded aluminum louvers (ASTM B221), of profiles shown on drawings, manufactured by Construction Specialties, Inc., or equal made by Airolite, Airline Products Co., or approved equal.
- B. Heads, sills, jambs and mullions to be one piece structural members of 6063-T52, alloy, .125" thick, with integral caulking slot and retaining beads. Blades to be minimum .081" thick. Closed cell PVC compression gaskets to be provided between bottom of mullion or jamb and top of sill to insure lead tight connections. Concealed structural supports to be designed by the louver manufacturer to carry a wind load of not less than forty (40) lbs. per square foot. All fasteners to be stainless steel.
- C. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: Cleaned with inhibited chemicals; Chemical Finish: Acid-chromate-fluoride-phosphate conversion coating; Organic Coating: As specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturer's written instructions.
 - 1. Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermo-cured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605-98.
 - 2. Custom color and gloss as selected by the Commissioner.
- D. Louvers shall be furnished with aluminum wire intercrimp insect screen secured in removable extruded aluminum frames.
- E. Provide aluminum blank off panels behind louvers where shown on mechanical drawings, fabricated from 1/8" thick aluminum face sheets, finish to match louvers; reinforce as required to form rigid assembly. Blank off panels shall be insulated with thermafiber insulation of thickness needed to insure an R value of eleven (11).

- F. Fastenings: Fasteners for exterior application shall be stainless steel. Provide types, gauges and lengths to suit unit installation conditions. Use Phillips flat head machine screws for exposed fasteners, unless otherwise indicated.
- G. Anchors and Inserts: Use non-ferrous metal or hot dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use steel or lead expansion bolt devices for drilled in place anchors. Furnish inserts, as required, to be set into concrete or masonry work.
- H. Bituminous Paint: SSPC-Paint 12 (cold applied asphalt mastic).

2.2 FABRICATION, GENERAL

- A. Fabricate frames including integral sills to suit adjacent construction with tolerances for installation, including application of sealants in joints between louvers and adjoining work.
- B. Include supports, anchorages, and accessories required for complete assembly.
- C. Provide sill extensions made of same material as louvers, where indicated, or required for drainage to exterior and to prevent water penetrating to interior.
- D. Join frame members to one another and to stationary louver blades by welding, except where indicated otherwise or where field bolted connections between frame members are necessary by size of louvers. Maintain equal blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where aluminum louvers are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions and directions for the installation of anchorages which are to be embedded in masonry construction. Coordinate the delivery of such items to the project site.

3.3 INSTALLATION

- A. Locate and place louver units plumb, level and in proper alignment with adjacent work.
- B. Use concealed anchorages wherever possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joint fillers, as indicated.

12/21/2012

- D. Repair finishes damaged by cutting, welding, soldering and grinding operations required for fitting and jointing. Restore finishes and prime coats of paint so that there is no evidence of corrective work. Return items which cannot be refinished in the field to the shop, make the required alterations, and refinish the entire unit, or provide new units, at Contractor's option.
- E. Protect aluminum surfaces from corrosion by application of a heavy coating of bituminous paint on surfaces which will be in contact with concrete, masonry or dissimilar metals.
- F. Provide concealed gaskets, flashings, joint fillers and insulations, and install as the work progresses to make the installations weathertight.

END OF SECTION

SECTION 090160.91

FLOORING RESTORATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. LEED BUILDING - GENERAL REQUIREMENTS:

The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SUMMARY

- A. Section includes maintenance of terrazzo assemblies consisting of terrazzo restoration and cleaning as follows:
1. Repair of terrazzo landing and treads at existing stairs.
- B. Related Sections:
1. Construction Waste Management and Disposal - Section 017419
 2. Sustainable Design Requirements (LEED Building) - Section 018113
 3. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3
 4. Construction IAQ Requirements - Section 018119
 5. Joint Sealers- Section 079200

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.
- E. Stone Terminology: ASTM C 119.

1.4 ACTION SUBMITTALS

A. LEED BUILDING Submittal Requirements:

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Sustainable Design Requirements (LEED Building) - Section 018113 of these specifications.
2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the LEED Consultant for review.

B. Product Data: For each type of product indicated. Include recommendations for application and use. Include test data substantiating that products comply with requirements.

C. Shop Drawings: For the following:

1. Areas of patching & repair at each stair run and landing.
2. Provisions for expansion joints or other sealant joints.

D. Samples for Initial Selection: For the following:

1. Patching Compound: Submit sets of patching compound samples in the form of plugs (patches in drilled holes) in sample units of terrazzo flooring representative of the range of terrazzo colors in the building.
 - a. Have each set contain a close color range of at least six Samples of different mixes of patching compound that matches the variations in existing terrazzo when cured and dry.
2. Sealant Materials: See Section 079200 "Joint Sealants."
3. Include similar Samples of accessories involving color selection.

E. Samples for Verification: For the following:

1. Each type of terrazzo patching compound, at least 3 inches long by 1-1/2 inches wide. Document each Sample with manufacturer and stock number or other information necessary to order additional material.
2. Each type of adhesive.
3. Each type of aggregate.
4. Sealant Materials: See Section 079200 "Joint Sealants."
5. Accessories: Each type of anchor, accessory, and miscellaneous support.

1.5 QUALITY ASSURANCE

A. LEED BUILDING - GENERAL REQUIREMENTS:

The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

B. Mockups: Prepare mockups of restoration and cleaning to demonstrate aesthetic effects and set quality standards for materials and execution and for fabrication and installation.

1. Terrazzo Repair: Prepare sample areas for each type of terrazzo indicated to have repair work performed. If not otherwise indicated, size each mockup not smaller than 24 inches in least dimension. Erect sample areas unless otherwise indicated, to demonstrate quality of materials, workmanship, and blending with existing work. Include the following as a minimum:
 - a. Terrazzo Patching: Three small areas at each landing and 1 tread at each run.
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. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
4. Review methods and procedures related to terrazzo restoration and cleaning including, but not limited to, the following:
 - a. Construction Schedule: Verify availability of materials, Restoration Specialist's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Materials, material application, sequencing, tolerances, and required clearances.

1.6 DELIVERY, STORAGE, AND HANDLING

- ##### A. Deliver other materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.

- 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 hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.
- D. Store lime putty covered with water in sealed containers.
- E. Store sand where grading and other required characteristics can be maintained and contamination avoided.

1.7 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit terrazzo restoration and cleaning work to be performed according to manufacturers' written instructions and specified requirements.
- B. For manufactured repair materials, perform work within the environmental limits set by each manufacturer.
- C. Clean terrazzo surfaces only when air temperature is 40 deg F and above and is predicted to remain so for at least 7 days after completion of cleaning.

1.8 SEQUENCING AND SCHEDULING

- A. Order replacement materials at earliest possible date to avoid delaying completion of the Work.
- B. Perform terrazzo restoration work in the following sequence:
 - 1. Inspect for open joints and repair before cleaning to prevent the intrusion of water and other cleaning materials into the floor.
 - 2. Remove paint.
 - 3. Clean terrazzo surfaces.
 - 4. Repair terrazzo.
 - 5. After repairs have been completed and cured, perform a final cleaning to remove residues from this work.

PART 2 - PRODUCTS

2.1 MANUFACTURED REPAIR MATERIALS

- A. Concrete Patching Compound: Factory-mixed cementitious product that is custom manufactured for patching terrazzo.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. 3M Scotch-Weld Concrete Repair DP-600

- b. Edison Coatings, Inc, Deck-Top 47
 - c. Cathedral Stone Products, Inc., Jahn M90-HG
 - 2. Use formulation that is vapor- and water permeable, exhibits low shrinkage, has lower modulus of elasticity than the terrazzo units being repaired, and develops high bond strength to all types of terrazzo.
 - 3. Use formulation having working qualities and retardation control to permit forming and sculpturing where necessary.
 - 4. Formulate patching compound in colors, textures, and grain to match terrazzo being patched.
- B. Aggregate: To match existing terrazzo aggregate.

2.2 PAINT REMOVERS

- A. Low-Odor, Solvent-Type Paint Remover: Manufacturer's standard low-odor, water-rinsable solvent-type gel formulation, containing no methanol or methylene chloride, for removing paint coatings from masonry.
- 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. ABR Products, Inc.; Super Bio Strip Gel.
 - b. Cathedral Stone Products, Inc.; S-301 S-303 or S-305.
 - c. Dumond Chemicals, Inc.; Peel Away 6 Peel Away 7 or Peel Away 21.
 - d. PROSOCO; Enviro Klean Safety Peel 1 or Enviro Klean Safety Peel 3.

2.3 CLEANING MATERIALS

- A. Water: Potable.
- B. Hot Water: Water heated to a temperature of 140 to 160 deg F.
- C. Job-Mixed Detergent Solution: Solution prepared by mixing 2 cups of tetrasodium polyphosphate, 1/2 cup of laundry detergent, and 20 quarts of hot water for every 5 gal. of solution required.
- D. Job-Mixed Mold, Mildew, and Algae Remover: Solution prepared by mixing 2 cups of tetrasodium polyphosphate, 5 quarts of 5 percent sodium hypochlorite (bleach), and 15 quarts of hot water for every 5 gal. of solution required.

PART 3 - EXECUTION

3.1 PROTECTION

- A. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from terrazzo restoration work.

- B. Comply with chemical-cleaner manufacturer's written instructions for protecting building 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 chemical cleaners being used will not damage adjacent surfaces. Use materials that contain only waterproof, UV-resistant adhesives. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
2. Keep wall wet below area being cleaned to prevent streaking from runoff.
3. Do not clean terrazzo during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
4. Neutralize and collect alkaline and acid wastes for disposal off City of New York's property.
5. Dispose of runoff from cleaning 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.

3.2 CLEANING TERRAZZO, GENERAL

- A. Use only those cleaning methods indicated for each terrazzo material and location.

1. Do not use wire brushes or brushes that are not resistant to chemical cleaner being used. Do not use plastic-bristle brushes if natural-fiber brushes will resist chemical cleaner being used.
2. Use spray equipment that provides controlled application at volume and pressure indicated, measured at spray tip. Adjust pressure and volume to ensure that cleaning methods do not damage terrazzo.
 - a. Equip units with pressure gages.
3. For chemical-cleaner spray application, use low-pressure tank or chemical pump suitable for chemical cleaner indicated, equipped with cone-shaped spray tip.
4. For water-spray application, use fan-shaped spray tip that disperses water at an angle of 25 to 50 degrees.
5. For high-pressure water-spray application, use fan-shaped spray tip that disperses water at an angle of at least 40 degrees.
6. For heated water-spray application, use equipment capable of maintaining temperature between 140 and 160 deg F at flow rates indicated.
7. For steam application, use steam generator capable of delivering live steam at nozzle.

- B. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces that produces an even effect without streaking or damaging terrazzo surfaces.

- C. Water Application Methods:

1. Water-Soak Application: Soak terrazzo 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 surface of terrazzo and apply water in horizontal back and forth sweeping motion, overlapping previous strokes to produce uniform coverage.
- D. Steam Cleaning: Apply steam to terrazzo surfaces at the very low pressures indicated for each type of stonework. Hold nozzle at least 6 inches from surface of terrazzo and apply steam in horizontal back and forth sweeping motion, overlapping previous strokes to produce uniform coverage.
- E. Chemical-Cleaner Application Methods: Apply chemical cleaners to terrazzo surfaces to comply with chemical-cleaner manufacturer's written instructions; use brush application. Do not allow chemicals to remain on surface for periods longer than those indicated or recommended by manufacturer.
- F. After cleaning is complete, remove protection no longer required. Remove tape and adhesive marks.

3.3 PRELIMINARY CLEANING

- A. Preliminary Cleaning: Before beginning general cleaning, remove extraneous substances that are resistant to cleaning methods being used. Extraneous substances include paint, calking.
1. Carefully remove heavy accumulations of material from surface of terrazzo with sharp chisel. Do not scratch or chip terrazzo surface.
 2. Remove paint and calking with alkaline paint remover.
 - a. Comply with requirements in "Paint Removal" Article.
 - b. Repeat application up to two times if needed.

3.4 PAINT REMOVAL

- A. Paint Removal with Alkaline Paste Paint Remover:
1. Remove loose and peeling paint using low-pressure spray, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
 2. Apply paint remover to dry, painted terrazzo with brushes.
 3. Allow paint remover to remain on surface for period recommended by manufacturer.
 4. Rinse with hot water applied by low-pressure spray to remove chemicals and paint residue.
 5. Repeat process if necessary to remove all paint.
 6. Apply acidic cleaner or manufacturer's recommended afterwash to terrazzo, while surface is still wet, using low-pressure spray equipment or soft-fiber brush. Let cleaner or afterwash remain on surface as a neutralizing agent for period recommended by chemical-cleaner or afterwash manufacturer.

7. Rinse with cold water applied by low-pressure spray to remove chemicals and soil.
- B. Paint Removal with Covered or Skin-Forming Alkaline Paint Remover:
1. Apply paint remover to dry, painted terrazzo with trowel, spatula, or as recommended by manufacturer.
 2. Apply cover, if required by manufacturer, per manufacturer's written instructions.
 3. Allow paint remover to remain on surface for period recommended by manufacturer or as determined in test panels.
 4. Scrape off paint and remover and collect for disposal.
 5. Rinse with hot water applied by low-pressure spray to remove chemicals and paint residue.
 6. Use alkaline paste paint remover, according to "Paint Removal with Alkaline Paste Paint Remover" Paragraph, if necessary to remove remaining paint.
 7. Apply acidic cleaner or manufacturer's recommended afterwash to terrazzo, while surface is still wet, using low-pressure spray equipment or soft-fiber brush. Let cleaner or afterwash remain on surface as a neutralizing agent for period recommended by chemical-cleaner or afterwash manufacturer.
 8. Rinse with cold water applied by low-pressure spray to remove chemicals and soil.
- C. Paint Removal with Solvent-Type Paint Remover:
1. Remove loose and peeling paint using low-pressure spray, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
 2. Apply thick coating of paint remover to painted terrazzo with natural-fiber cleaning brush, deep-nap roller, or large paint brush.
 3. Allow paint remover to remain on surface for period recommended by manufacturer.
 4. Rinse with hot water applied by low-pressure spray to remove chemicals and paint residue.

3.5 CLEANING TERRAZZO

- A. Cold-Water Wash: Use cold water applied by low-pressure spray.
- B. Hot-Water Wash: Use hot water applied by low-pressure spray.
- C. Detergent Cleaning:
1. Wet terrazzo with hot water applied by low-pressure spray.
 2. Scrub terrazzo with detergent solution using medium-soft brushes 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 terrazzo surface remains wet.
 3. Rinse with hot water applied by low-pressure spray to remove detergent solution and soil.
 4. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.
- D. Mold, Mildew, and Algae Removal:
1. Wet terrazzo with hot water applied by low-pressure spray.

2. Apply mold, mildew, and algae remover by brush or low-pressure spray.
3. Scrub terrazzo with medium-soft brushes 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 terrazzo surface remains wet.
4. Rinse with hot water applied by low-pressure spray to remove mold, mildew, and algae remover and soil.
5. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.

3.6 FIELD QUALITY CONTROL

- A. Inspectors: City of New York will engage qualified independent inspectors to perform inspections and prepare test reports. Allow inspectors use of lift devices and scaffolding, as needed, to perform inspections.
- B. Commissioner's Project Representatives: Commissioner will assign Project representatives to help carry out Commissioner's responsibilities at the site, including observing progress and quality of portion of the Work completed. Allow Commissioner's Project representatives use of lift devices and scaffolding, as needed, to observe progress and quality of portion of the Work completed.

END OF SECTION 040140

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 092400

PORTLAND CEMENT PLASTERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SUMMARY

- A. Section Includes:
 - 1. Exterior Portland cement plasterwork (stucco) on metal lath.
- B. Related Sections:
 - 1. Construction Waste Management and Disposal - Section 017419
 - 2. Sustainable Design Requirements (LEED Building) - Section 018113
 - 3. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings -
Section 018113.3
 - 4. Construction IAQ Requirements - Section 018119
 - 5. Unit masonry - Section 042000.
 - 6. Miscellaneous Metals- Section 055000
 - 7. Joint Sealers – Section 079200
 - 8. Sheet Metal Flashing – Section 076200

- 9. Flexible Flashing – Section 076500
- 10. Painting and Finishing – Section 099000
- 11. Breathable Masonry Coating – Section 099200
- 12. Exterior Lighting- Section 265600

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED BUILDING Submittal Requirements:
The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 - 1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Sustainable Design Requirements (LEED Building) - Section 018113 of these specifications.
 - 2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
 - 3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
 - 1. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
 - 5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the LEED Consultant for review.
- C. Shop Drawings: Show locations and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other work.
- D. Samples for Initial Selection: For each type of factory-prepared finish coat indicated.
- E. Manufacturer's color chart for selection of finished color coat.
- F. Samples for Verification: For each type of finish coat indicated; 12 by 12 inches, and prepared on rigid backing.
- G. Mock-up: prepare a 3' long section addressing all condition or review and approval. If approved, work can be incorporated into the project.

1.4 QUALITY ASSURANCE

- A. Fire-Resistance Ratings: Where indicated, provide portland cement plaster assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 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.
- B. Sound-Transmission Characteristics: Where indicated, provide portland cement plaster assemblies identical to those of assemblies tested for STC ratings per ASTM E 90 and classified according to ASTM E 413 by a qualified testing agency.
- C. Mockups: Before plastering, install mockups of at least 3 linear feet in full height application in surface area to demonstrate aesthetic effects and set quality standards for materials, detail conditions and execution.
 - 1. Show all typical conditions as part of the mock-up.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

1.6 PROJECT CONDITIONS

- A. Comply with ASTM C 926 requirements.
- B. Exterior Plasterwork:
 - 1. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
 - 2. Apply plaster when ambient temperature is greater than 40 deg F and less than 90 deg F.
 - 3. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.
- C. Factory-Prepared Finishes: Comply with manufacturer's written recommendations for environmental conditions for applying finishes.

PART 2 - PRODUCTS

2.1 METAL LATH

- A. Expanded-Metal Lath: ASTM C 847 with ASTM A 653/A 653M, G60, hot-dip galvanized zinc coating.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Alabama Metal Industries Corporation; a Gibraltar Industries company.
- b. CEMCO.
- c. Clark Western Building Systems.
- d. Dietrich Metal Framing; a Worthington Industries company.
- e. MarinoWARE.
- f. Phillips Manufacturing Co.

2. Diamond-Mesh Lath: Flat,.

B. Wire-Fabric Lath:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Davis Wire Corporation; a Heico Wire Group company.
- b. Jaenson Wire Company.
- c. Keystone Steel & Wire Co.
- d. K-Lath; a division of Georgetown Wire.

2. Welded-Wire Lath: ASTM C 933; self-furring, 1.95 lb/sq. yd..
3. Woven-Wire Lath: ASTM C 1032; self-furring, with stiffener wire backing, 1.4 lb/sq. yd..
4. Flat Rib Lath: Rib depth of not more than 1/8 inch, 3.4 lb/sq.yd

2.2 ACCESSORIES

- A. General: Comply with ASTM C 1063 and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.

B. Zinc and Zinc-Coated (Galvanized) Accessories:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Alabama Metal Industries Corporation; a Gibraltar Industries company.
- b. CEMCO.
- c. Clark Western Building Systems.
- d. Dietrich Metal Framing; a Worthington Industries company.
- e. MarinoWARE.
- f. Phillips Manufacturing Co.

2. Foundation Weep Screed: Fabricated from hot-dip galvanized-steel sheet, ASTM A 653/A 653M, G60 zinc coating.
3. Cornerite: Fabricated from metal lath with ASTM A 653/A 653M, G60, hot-dip galvanized zinc coating.
4. External-Corner Reinforcement: Fabricated from metal lath with ASTM A 653/A 653M, G60, hot-dip galvanized zinc coating.

5. Cornerbeads: Fabricated from zinc-coated (galvanized) steel.
 - a. Small nose cornerbead with expanded flanges; use unless otherwise indicated.
 - b. Small nose cornerbead with perforated flanges; use on curved corners.
 - c. Small nose cornerbead with expanded flanges reinforced by perforated stiffening rib; use on columns and for finishing masonry corners.
 - d. Bull nose cornerbead, radius 3/4 inch minimum, with expanded flanges; use at locations indicated on Drawings.
6. Casing Beads: Fabricated from zinc-coated (galvanized) steel; square-edged style; with expanded flanges.
7. Control Joints: Fabricated from zinc-coated (galvanized) steel; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
8. Expansion Joints: Fabricated from zinc-coated (galvanized) steel; folded pair of unperforated screeds in M-shaped configuration; with expanded flanges.
9. Two-Piece Expansion Joints: Fabricated from zinc-coated (galvanized) steel; formed to produce slip-joint and square-edged reveal that is adjustable from 1/4 to 5/8 inch wide; with perforated flanges.

2.3 MISCELLANEOUS MATERIALS

- A. Water for Mixing: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.
- B. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch long, free of contaminants, manufactured for use in portland cement plaster.
- C. Bonding Compound: ASTM C 932.
- D. Steel Drill Screws: For metal-to-metal fastening, ASTM C 1002 or ASTM C 954, as required by thickness of metal being fastened; with pan head that is suitable for application; in lengths required to achieve penetration through joined materials of no fewer than three exposed threads.
- E. Fasteners for Attaching Metal Lath to Substrates: Complying with ASTM C 1063.
- F. Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, not less than 0.0475-inch diameter, unless otherwise indicated.
- G. Sound Attenuation Blankets: ASTM C 665, 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.
- H. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."
 1. Sealants shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.4 PLASTER MATERIALS

- A. Portland Cement: ASTM C 150, Type II.
 1. Color for Finish Coats: White selected from manufacturer's standard chart.
- B. Masonry Cement: ASTM C 91, Type N.
 1. Color for Finish Coats: White.
- C. Plastic Cement: ASTM C 1328.
- D. Colorants for Job-Mixed Finish Coats: Colorfast mineral pigments that produce finish plaster color as selected from manufacturer's color chart.
- E. Lime: ASTM C 206, Type S; or ASTM C 207, Type S.
- F. Sand Aggregate: ASTM C 897.
 1. Color for Job-Mixed Finish Coats: White selected from manufacturer's standard chart.
- G. Perlite Aggregate: ASTM C 35.
- H. Ready-Mixed Finish-Coat Plaster: Mill-mixed portland cement, aggregates, coloring agents, and proprietary ingredients.
 1. Products: Subject to compliance with requirements, provide the following:
 - a. Bonsal American, an Oldcastle Company; Marblesil Stucco Mix.
 - b. California Stucco Products Corp.; Conventional Portland Cement Stucco.
 - c. El Rey Stucco Company, Inc., a brand of ParexLaHabra, Inc.; Premium Stucco Finish.
 - d. Florida Stucco; Florida Stucco.
 - e. LaHabra, a brand of ParexLaHabra, Inc.; Exterior Stucco Color Coat.
 - f. Omega Products International, Inc.; ColorTek Exterior Stucco.
 - g. QUIKCRETE; QUIKCRETE Finish Coat Stucco, No. 1201.
 - h. Shamrock Stucco LLC; Exterior Stucco.
 - i. SonoWall, BASF Wall Systems, Inc.; Thoro Stucco.
 - j. USG Corporation; Oriental Exterior Finish Stucco.
 2. Color: As selected by Commissioner from manufacturer's full range.
- I. Acrylic-Based Finish Coatings: Factory-mixed acrylic-emulsion coating systems, formulated with colorfast mineral pigments and fine aggregates; for use over portland cement plaster base coats. Include manufacturer's recommended primers and sealing topcoats for acrylic-based finishes.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. Acrocrete, BASF Wall Systems, Inc.; Acrotex.
- b. California Stucco Products Corp.; Texture Flex.
- c. Dryvit Systems, Inc.; Dryvit TAFS.
- d. El Rey Stucco Company, Inc., a brand of ParexLaHabra, Inc.; Prema-Flex.
- e. Finestone, BASF Wall Systems, Inc.; PebbleTex.
- f. LaHabra, a brand of ParexLaHabra, Inc.; Acrylic Finish.
- g. Master Wall Inc.; Superior Finishes.
- h. Omega Products International, Inc.; Omega Flex Finishes.
- i. Parex, Inc., a brand of ParexLaHabra, Inc.; e-elastic.
- j. Pleko Group LLC Products, Inc.; Pleko Structure Finishes.
- k. Senergy, BASF Wall Systems, Inc.; Senerflex.
- l. Shamrock Stucco LLC; Stucco Acrylic Finish.
- m. Sto Corp.; Powerwall Finish.
- n. Stuc-O-Flex International, Inc.; Elastomeric Finish
- o. Surewall, a brand of ParexLaHabra, Inc.; Acrylic Finish.
- p. SonoWall, BASF Wall Systems, Inc.; StuccoTex Finish.

2. Color: As selected by Commissioner from manufacturer's full range.

2.5 PLASTER MIXES

A. General: Comply with ASTM C 926 for applications indicated.

1. Fiber Content: Add fiber to base-coat mixes after ingredients have mixed at least two minutes. Comply with fiber manufacturer's written instructions for fiber quantities in mixes, but do not exceed 1 lb of fiber/cu. yd. of cementitious materials.

B. Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork as follows:

1. Portland Cement Mixes:

- a. Scratch Coat: For cementitious material, mix 1 part portland cement and 0 to 3/4 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
- b. Brown Coat: For cementitious material, mix 1 part portland cement and 0 to 3/4 parts lime. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.

2. Masonry Cement Mixes:

- a. Scratch Coat: 1 part masonry cement and 2-1/2 to 4 parts aggregate.
- b. Brown Coat: 1 part masonry cement and 3 to 5 parts aggregate, but not less than volume of aggregate used in scratch coat.

3. Portland and Masonry Cement Mixes:

- a. Scratch Coat: For cementitious material, mix 1 part portland cement and 1 part masonry cement. Use 2-1/2 to 4 parts aggregate per part of cementitious material.

- b. Brown Coat: For cementitious material, mix 1 part portland cement and 1 part masonry cement. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.
- 4. Plastic Cement Mixes:
 - a. Scratch Coat: 1 part plastic cement and 2-1/2 to 4 parts aggregate.
 - b. Brown Coat: 1 part plastic cement and 3 to 5 parts aggregate, but not less than volume of aggregate used in scratch coat.
- 5. Portland and Plastic Cement Mixes:
 - a. Scratch Coat: For cementitious material, mix 1 part plastic cement and 1 part portland cement. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
 - b. Brown Coat: For cementitious material, mix 1 part plastic cement and 1 part portland cement. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.
- C. Base-Coat Mixes: Single base coats for two-coat plasterwork as follows:
 - 1. Portland Cement Mix: For cementitious material, mix 1 part portland cement and 0 to 3/4 part lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
 - 2. Portland and Masonry Cement Mix: For cementitious material, mix 1 part portland cement and 1 part masonry cement. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
 - 3. Plastic Cement Mix: Use 1 part plastic cement and 2-1/2 to 4 parts aggregate.
- D. Base-Coat Mixes: Single base coats for two-coat plasterwork as follows:
 - 1. Portland Cement Mix: For cementitious material, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
 - 2. Masonry Cement Mix: Use 1 part masonry cement and 2-1/2 to 4 parts aggregate.
 - 3. Plastic Cement Mix: Use 1 part plastic cement and 2-1/2 to 4 parts aggregate.
- E. Job-Mixed Finish-Coat Mixes:
 - 1. Portland Cement Mix: For cementitious materials, mix 1 part portland cement and [3/4 to 1-1/2] [1-1/2 to 2] parts lime. Use 1-1/2 to 3 parts aggregate per part of cementitious material.
 - 2. Masonry Cement Mix: 1 part masonry cement and 1-1/2 to 3 parts aggregate.
 - 3. Portland and Masonry Cement Mix: For cementitious materials, mix 1 part portland cement and 1 part masonry cement. Use 1-1/2 to 3 parts aggregate per part of cementitious material.
 - 4. Plastic Cement Mix: 1 part plastic cement and 1-1/2 to 3 parts aggregate.
- F. Factory-Prepared Finish-Coat Mixes: For acrylic-based finish coatings, comply with manufacturer's written instructions.

PART 3 - EXECUTION

3.1 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.

3.2 PREPARATION

- A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.
- B. Prepare solid substrates for plaster that are smooth or that do not have the suction capability required to bond with plaster according to ASTM C 926.

3.3 INSTALLATION, GENERAL

- A. Fire-Resistance-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.
- B. Sound Attenuation Blankets: Where required, install blankets before installing lath unless blankets are readily installed after lath has been installed on one side.
- C. Acoustical Sealant: Where required, seal joints between edges of plasterwork and abutting construction with acoustical sealant.

3.4 INSTALLING METAL LATH

- A. Expanded-Metal Lath: Install according to ASTM C 1063.
 - 1. Partition Framing and Vertical Furring: Install flat diamond-mesh lath.
 - 2. On Solid Surfaces, Not Otherwise Furred: Install self-furring, diamond-mesh lath.

3.5 INSTALLING ACCESSORIES

- A. Install according to ASTM C 1063 and at locations indicated on Drawings.
- B. Reinforcement for External Corners:
 - 1. Install lath-type, external-corner reinforcement at exterior locations.
 - 2. Install cornerbead at exterior locations.
- C. Control Joints: Install control joints in specific locations approved by Commissioner for visual effect as follows:

1. As required to delineate plasterwork into areas (panels) of the following maximum sizes:
 - a. Vertical Surfaces: 144 sq. ft..
 - b. Horizontal and other Nonvertical Surfaces: 100 sq. ft..
2. At distances between control joints of not greater than 18 feet o.c.
3. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
4. Where control joints occur in surface of construction directly behind plaster.
5. Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.

3.6 PLASTER APPLICATION

A. General: Comply with ASTM C 926.

1. Do not deviate more than plus or minus 1/4 inch in 10 feet from a true plane in finished plaster surfaces, as measured by a 10-foot straightedge placed on surface.
2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.

B. Bonding Compound: Apply on unit masonry plaster bases.

C. Walls; Base-Coach Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork, on masonry; 3/4-inch thickness.

1. Portland cement mixes.
2. Masonry cement mixes.
3. Portland and masonry cement mixes.
4. Plastic cement mixes.
5. Portland and plastic cement mixes.

D. Acrylic-Based Finish Coatings: Apply coating system, including primers, finish coats, and sealing topcoats, according to manufacturer's written instructions.

E. Concealed Exterior Plasterwork: Where plaster application will be used as a base for adhered finishes, omit finish coat.

F. Concealed Interior Plasterwork:

1. Where plaster application will be concealed behind built-in cabinets, similar furnishings, and equipment, apply finish coat.
2. Where plaster application will be concealed above suspended ceilings and in similar locations, finish coat may be omitted.
3. Where plaster application will be used as a base for adhesive application of tile and similar finishes, omit finish coat.

3.7 PLASTER REPAIRS

- A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

3.8 PROTECTION

- A. Remove temporary protection and enclosure of other work. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

END OF SECTION

THIS PAGE LEFT INTENTIONALL BLANK

SECTION 092500

GYPSUM DRYWALL

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the Contract Documents.

B LEED BUILDING - GENERAL REQUIREMENTS:

The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the gypsum drywall as shown on the drawings and/or specified herein, including, but not limited to, the following:
1. Gypsum board work for partitions, ceilings, column enclosures, furring, and elsewhere where gypsum drywall work is shown on drawings.
 2. Metal supports for gypsum drywall construction.
 3. Acoustical insulation for gypsum drywall work.
 4. Sealant for gypsum drywall work.
 5. Vapor retarder.
 6. Concealed metal reinforcing for attachment of railings, toilet partitions and other items supported on drywall partitions and walls.
 7. Taping and finishing of drywall joints.
 8. Installing rings and frames in drywall surfaces for grilles, registers and lighting fixtures.
 9. Gypsum shaftwall construction.

10. Bracing and connections.

1.3 RELATED SECTIONS

- A. Construction Waste Management and Disposal - Section 017419
- B. Sustainable Design Requirements (LEED Building) - Section 018113
- C. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3
- D. Construction IAQ Requirements - Section 018119
- E. Cast in Place Concrete - Section 033000.
- F. Unit Masonry – Section 042000
- G. Structural Steel Section 051200
- H. Miscellaneous Metals – Section 055000
- I. Rough Carpentry – Section 061000.
- K. Building Insulation - Section 072100.
- L. Steel Doors and Frames - Section 081113.
- M. Flush Wood Doors - Section 081416.
- N. Access doors - Section 083113.
- O. Aluminum Framed Entrances and Storefront – Section 084113
- P. Aluminum Windows – Section 085113
- Q. Painting and Finishing - Section 099000.
- R. Work in associated Divisions 21-23, 26-28
- S. Rings and trim for grilles, registers and light fixtures - Division 21-23, 26-28.

1.4 QUALITY ASSURANCE

- A. The following standards as well as other standards which may be referred to in this Section, shall apply as applicable to the work of this Section:
 - 1. Gypsum Drywall Construction Handbook, latest edition, U.S. Gypsum Co.
 - 2. ASTM C 645 "Standard Specification for Non-Load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels For Screw Application of Gypsum Board."

3. ASTM A 568 "Standard Specification for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements For."
 4. ASTM C 1396 "Standard Specification for Gypsum Board."
 5. ASTM C 475 "Standard Specification for Joint Treatment Materials For Gypsum Wallboard Construction."
 6. ASTM C 840 "Standard Specification for Application and Finishing of Gypsum Board."
 7. ASTM C 919 "Standard Specification for Use of Sealants in Acoustical Applications."
 8. ASTM C 954 "Standard Specification for Steel Drill Screws For the Application of Gypsum Board or Metal Plaster Bases to Steel Studs From 0.033 in. to 0.112 in. in Thickness."
 9. ASTM C 1002 "Standard Specification for Steel Drill Screws For the Application of Gypsum Board."
 10. ASTM C 754 "Standard Specification for Installation of Steel Framing Members to Receive Screw Attached Gypsum Board."
 11. ASTM D 3273 "Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber."
 12. ASTM C 1177 "Specification for Glass Mat Gypsum Substrate for Use at Sheathing."
 13. ASTM C 1178 "Specification for Glass Mat Water Resistant Gypsum Backing Board."
 14. ASTM C 1278 "Specification for Fiber Reinforced Gypsum Panels."
- B. Allowable Tolerances: 1/32" offsets between planes of board faces, and 1/16" in 8'-0" for plumb, level, warp and bow.
- C. System Design Load
1. Provide standard drywall assemblies designed and tested by manufacturer to withstand a lateral load of 5 lbs. per sq. ft. for the maximum wall height required, and with deflection limited to 1/240 of partition height.
 - a. Drywall assemblies with tile finish shall have a deflection limit of 1/360.
- D. Fire-Resistance Rating: Where gypsum drywall with fire resistance ratings are indicated, provide materials and installations which are identical with those of applicable assemblies tested per ASTM E 119 by fire testing laboratories, or to design designations in UL "Fire Resistance Directory" or in listing of other testing agencies

acceptable to authorities having jurisdiction, and compliant with UL Test #2079; criteria for cycle movement for all field height wall sections requiring allowance for vertical deflection within framing details.

- E. Installer: Firm with not less than 3 years of successful experience in the installation of specified materials.

F. LEED BUILDING Performance Criteria:

The following criteria are REQUIRED for the products included in this section:

1. Steel studs, track, and miscellaneous framing shall contain a minimum of 35% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials).
2. Gypsum wallboard shall contain "synthetic" gypsum produced with a minimum of 75% post-industrial recycled content, if readily available.
3. Certification of recycled content shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.
4. Steel framing and gypsum wallboard products harvested and manufactured within 500 miles (by air) of the project site shall be documented in accordance with the LEED BUILDING Submittal Requirements of this Section.
5. Adhesives or sealants used for work in this section shall meet the requirements of Section 018113.3 : Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
6. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.

1.5 SUBMITTALS

- A. Submit shop drawing for each drywall partition, furring and ceiling system showing size and gauges of framing members, hanger and anchorage devices, wallboard types, insulation, sealant, methods of assembly and fastening, control joints indicating column lines, corner details, joint finishing and relationship of drywall work to adjacent work.
- B. Samples: Each material specified herein, 12" x 12", or 12" long, or in manufacturer's container, as applicable for type of material submitted.
- C. Manufacturer's Literature: Submit technical and installation instructions for each drywall partition, furring and ceiling system specified herein, and for each fire-rated and sound-rated gypsum board assembly. Submit other data as required to show compliance with these specifications.
- D. Test Reports: This Contractor shall submit test report, obtained by drywall manufacturer, indicating conformance of drywall assemblies to required fire ratings and sound ratings.

E. LEED BUILDING Submittal Requirements

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

1.6 PRODUCT HANDLING AND PROTECTION

- A. Deliver, store and handle drywall work materials to prevent damage. Deliver materials in their original, unopened containers or bundles, and store where protected from moisture, damage and from exposure to the elements. Store wallboard in flat stacks.
- B. Protect wallboard from becoming wet.

1.7 ENVIRONMENTAL CONDITIONS

- A. Provide and maintain minimum temperature of fifty-five (55) degrees F. and adequate ventilation to eliminate excessive moisture within the building in the area of the drywall work for at least twenty-four (24) hours, prior to, during and after installation of drywall work. Installation shall not start until windows are glazed and doors are installed, unless openings are temporarily closed. Space above suspended ceilings shall be vented sufficiently to prevent temperature and pressure build up.

1.8 JOB MOCK-UP

- A. At a suitable location, where directed by the Commissioner, lay up a portion of a finished wall and ceiling demonstrating the quality of work, including finishing, to be obtained under this Section. Omit drywall boards in locations as directed by the Commissioner to show stud spacing and attachments; after acceptance, complete assembly.
- B. Adjust the finishing techniques as required to achieve the finish required by the Commissioner as described in this Section of these specifications.
- C. Upon approval of the mock-up, the mock-up may be left in place as a portion of the finished work of this Section.
- D. All drywall work shall be equal in quality to approved mock-up.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers: Materials specified below, unless noted otherwise or specified herein, are those of U.S. Gypsum Co. Equivalent materials of National Gypsum Co., Georgia Pacific, Temple Inland and Lafarge or approved equal meeting specification requirements are acceptable.

2.2 METAL SUPPORTS

A. Metal Floor and Ceiling Runners

- 1. Channel Type: Formed from 20 U.S. Std. gauge (unless otherwise noted) galvanized steel, width to suit channel type metal studs. Use 20 ga. top runners with 1-1/4" minimum flanges.
- 2. Ceiling runners and head of wall connections at rated partitions shall conform to UL #2079 for cycle movement. Provide positive mechanical connection of framing to structure, allowing for vertical movement within connections. Minimum of 20 ga. galvanized steel for clips, 25 ga. galvanized steel for ceiling runners. Providing a friction free – anti-seizure movement capacity.
 - a. As manufactured by the Steel Network, VertiClip or VertiTrack or approved equal.
 - b. FireTrak (including stud clips) by FireTrak Corp or approved equal.
- 3. "J" Type: Formed from 20 U.S. Std. gauge galvanized steel, 1" x 2-1/2" or 4" wide (to suit detail) x 2-1/4" (for shaft wall).

B. Metal Studs, Framing and Furring

1. Channel Type Studs: Channel type with holes for passage of conduit formed from minimum 20 U.S. Std. gauge (unless heavier gauge is required to meet deflection limits) galvanized steel, width as shown on drawings.
2. Furring Channels: Hat shaped, formed from galvanized steel, 25 U.S. Std. gauge.
3. "C-H" Type Stud: 1-1/2" x 2-1/2", 4" or 6" wide (to suit detail) galvanized steel. Use for shaft wall construction; gauge and size as required to meet deflection limits given herein.
4. Double "E" Type Stud: 2" x 2-1/2", 4" or 6" wide (to suit detail) galvanized steel. Use for shaft wall construction; gauge and size as required to meet deflection limits given herein.
5. Continuous 16 gauge x 8" wide steel wall plate screwed to studs as required for support of railings, toilet partitions and other items supported on drywall partitions and walls.

C. Suspended Ceiling and Fascia Supports

1. Main Runners: 1-1/2" steel channels, cold rolled at 0.475 lbs. per ft., rust-inhibitive paint finish.
2. Furring Members: Screw-type hat-shaped furring channels of 25 ga. zinc-coated steel; comply with ASTM C 645.
3. Hangers: Galvanized, 1" x 3/16" flat steel slats capable of supporting 5x calculated load supported.
4. Hanger Anchorages: Provide inserts, clips, bolts, screws and other devices applicable to the required method of structural anchorage for ceiling hangers. Size devices for 5x calculated load supported.
5. Furring Anchorages: 16 ga. galvanized wire ties, manufacturer's standard clips, bolts or screws as recommended by furring manufacturer.

2.3 INTERIOR GYPSUM WALLBOARDS

A. Manufacturers:

- a. Georgia-Pacific Gypsum, LLC
- b. USG Corporation
- c. CetainTeed Corporation
- d. Temple-Inland
- e. Or approved equal.

12/21/2012

- B. Gypsum Wall Board: 1/2" thick and 5/8" thick as indicated on drawings, mold-resistant with 90% recycled content, 48" wide, in maximum lengths available to minimize end-to-end butt joints.
- C. Fire Rated Gypsum Wall Board: 1/2" thick and 5/8" thick as indicated on drawings, "Sheetrock Firecode C" or approved equal by alternate manufacturers, 48" wide, in maximum lengths available to minimize end-to-end butt joints.
- D. Water Resistant Gypsum Wall Board (wet areas): 1/2" thick and 5/8" thick as indicated on drawings, "Sheetrock W/R" or "Sheetrock Firecode C W/R," 48" wide or approved equal by alternate manufacturers, in maximum lengths available to minimize end-to-end butt joints.
- E. Shaft Wall Liner: Solid gypsum board liner for shaft wall construction, 1" thick, 24" wide, as required to suit condition, by standard lengths as required, beveled edges. Provide "Sheetrock Brand Liner Panel, Enhanced" or "DensGlass Ultra Shaft Guard" by Georgia Pacific, or approved equal by alternate manufacturers.
- F. Exterior for Ceiling and Soffit Application: Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C1177M. "Dens-Glass Gold" by G-P Gypsum, "Securock Glass Mat Sheathing" by United States Gypsum Co, "GlasRoc Sheathing" by CertainTeed Corporation or approved equal with 5/8" core, Type X and square edges.

2.4 ACCESSORIES

- A. Acoustic Insulation
- B. Fasteners for Wall Board: USG Brand Screws; Type S Bugle Head for fastening wallboard to lighter gauge interior metal framing (up to 20 ga.). Type S-12 Bugle Head for fastening wallboard to heavier gauge interior metal framing (20 ga. to 12 ga.); Type S and Type S-12 Pan Head for attaching metal studs to door frames and runners; and Type G Bugle Head for fastening wallboard to wall board. Lengths specified below under "Part 3 - Execution" Articles and as recommended by drywall manufacturer.
- C. Laminating Adhesive: "Sheetrock Brand Joint Compound." or approved equal
- D. Metal Trim - Corner Beads: For 90 degree External Corners - "Dur-A-Bead" No. 103, 27 U.S. Std. ga. galvanized steel, 1-1/4" x 1-1/4", for 90 degree external corners or approved equal.
- E. Metal Trim - Edge Beads: "Sheetrock Brand Paper Faced Metal Bead and Trim." or approved equal
- F. Metal Trim for Glass-Mat Exterior Board Application: Exterior trim to be ASTM C1047, hot-dip galvanized steel sheet, plastic or rolled zinc with corner bead and J-shaped LC bead; exposed long flange to receive joint compound unless otherwise instructed by the manufacturer or approved equal

- G. Metal Trim Treatment Materials and Joint Treatment Materials for Gypsum Drywall Boards: Paper tape for joint reinforcing; Setting Type (Durabond 90) or Lightweight Setting Type Joint Compound or approved equal for taping and topping; and Ready Mix Compound for finishing or approved equal.
 - 1. For areas to receive mold-resistant drywall, use tape with compounds as recommended by manufacturer.
- H. Control Joints: No. 0.093, USG or approved equal.
- I. Acoustical Sealant: USG "Acoustical Sealant" or "Tremco Acoustical Caulking" of Tremco Mfg. Co., or approved equal.
- J. Setting Compound for exterior application: G-P gypsum "Toughrock Setting Compound" or approved equal.
- K. Neoprene Gaskets: Conform to ASTM D 1056.
- L. Vapor Retarder: Griffolyn or approved equal.
- M. Fiberglass Sheet: Lumaguard AG1.5 by American Acrylic Group or approved equal. Install between metal studs and non-rated metal partitions.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where gypsum drywall is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. General

- 1. Install drywall work in accordance with drywall manufacturer's printed instructions and as indicated on drawings and specified herein.
- 2. All metal framing for drywall partitions shall extend from floor to underside of structural deck above. Provide for vertical deflection with positive mechanical connections of framing members to structure.
- 3. Provide concealed reinforcement, 16 ga. thick by eight (8) inches wide or as detailed or as recommended by manufacturer, for attachment of railings, toilet partitions, and other items to be supported on the partitions which cannot be attached to the metal framing members. Concealed reinforcement shall span between metal studs and be attached thereto using two (2) self-tapping pan head screws at each stud.

- a. Back of drywall shall be scored or notched to prevent bulging out where reinforcement plate occurs.
- B. Fire-Rated Assemblies: Install fire-rated assemblies in accordance with requirements of authorities having jurisdiction, Underwriters' Laboratories and test results obtained and published by the drywall manufacturer, for the fire-rated drywall assembly types indicated on the drawings.
- C. Acoustic Assemblies: Install acoustic rated assemblies to achieve a minimum STC as noted on drawings, in accordance with test results obtained and published by the drywall manufacturer, for the drywall assembly type indicated on the drawings.
- D. Sealant
 1. Install continuous acoustical sealant bead at top and bottom edges of wallboard where indicated or required for sound rating as wallboard is installed, and between metal trim edge beads and abutting construction.
 2. Install acoustical sealant in 1/8" wide vertical control joints within the length of the wall or partitions, and in all other joints, specified below under "Control Joints." Install bead of acoustical sealant around electric switch and outlet boxes, piping, ducts, and around any other penetration in the wallboard; place sealant bead between penetrations and edge of wallboard.
 3. Where sealant is exposed to view, protect adjacent surfaces from damage and from sealant material, and tool sealant flush with and in same plane as wallboard surface. Sealant beads shall be 1/4" to 3/8" diameter.
- E. Wall Board Application
 1. See drawings for all board types. Use fire-rated wallboard for fire-rated assemblies. Use water-resistant wallboard where indicated on drawings and where wallboard would be subject to moisture. Install water-resistant wallboard in full, large sheets (no scraps) to limit number of butt joints.
 2. Apply wallboard with long dimension parallel to stud framing members, and with abutting edges occurring over stud flanges.
 3. Install wallboard for partitions from floor to underside of structure above and secure rigidly in place by screw attachment, unless otherwise indicated.
 4. Provide manufacturer's safing insulation meeting standards of Section 07840 at flutes of metal deck where partitions carry up to bottom of metal deck.
 5. Neatly cut wallboard to fit around outlets, switch boxes, framed openings, piping, ducts, and other items which penetrate wallboard; fill gaps with acoustic sealant.
 6. Where wallboard is to be applied to curved surfaces, dampen wallboard on back side as required to obtain required curve. Finish surface shall present smooth, even curve without fluting or other imperfections.

7. Screw fasten wallboard with power-driven electric screw driver, screw heads to slightly depress surface of wallboard without cutting paper, screws not closer than 3/8" from ends and edges of wallboard.
 8. Where studs are doubled-up, screw fasten wallboard to both studs in a staggered pattern.
- F. Metal Trim: Install and mechanically secure in accordance with manufacturer's instructions; and finish with three (3) coats of joint compound, feathered and finish sanded smooth with adjacent wallboard surface, in accordance with manufacturer's instructions.
1. Corner Beads: Install specified corner beads in single lengths at all external corners, unless corner lengths exceed standard stock lengths.
 2. Edge Beads: Install specified edge beads in single lengths at all terminating edges of wallboard exposed to view, where edges abut dissimilar materials, where edges would be exposed to view, and elsewhere where shown on drawings. Where indicated on drawings, seal joint between metal edge bead and adjoining surface with specified gasket, 1/8" wide minimum and set back 1/8" from face of wallboard, unless other size and profile indicated on drawings.
 3. Casing beads shall be set in long lengths, neatly butted at joints. Provide casing beads at juncture of board and vertical surfaces and at exposed perimeters.
- G. Control Joint Locations: Gypsum board surfaces shall be isolated with control joints where:
1. Ceiling abuts a structural element, dissimilar wall or other vertical penetration.
 2. Construction changes within the plane of the partition or ceiling.
 3. Shown on approved shop drawings.
 4. Ceiling dimensions exceed thirty (30) feet in either direction.
 5. Wings of "L," "U," and "T" shaped ceiling areas are joined.
 6. Expansion or control joints occur in the structural elements of the building.
 7. Shaft wall runs exceed 30' without interruption.
 8. Partition or furring abuts a structural element or dissimilar wall or ceiling.
 9. Partition or furring runs exceed 30' without interruption.
 10. Where control joints are required, ceiling height door frames may be used as control joints. Less than ceiling height frames shall have control joints extending to the ceiling from both corners.

H. Joint Treatment and Spackling

1. Joints between face wallboards in the same plane, joints at internal corners of intersecting partitions and joints at internal corners of intersections between ceilings and walls or partitions shall be filled with joint compound.
2. Screw heads and other depressions shall be filled with joint compound. Joint compound shall be applied in three (3) coats, feathered and finish surface sanded smooth with adjacent wallboard surface, in accordance with manufacturer's instructions. Treatment of joints and screw heads with joint compound is also required where wallboard will be covered by finish materials which require a smooth surface, such as vinyl wall coverings.

3.3 FURRED WALLS AND PARTITIONS

- A. Use specified metal furring channels. Run metal furring channel framing members vertically, space sixteen (16) inches o.c. maximum. Fasten furring channels to concrete or masonry surfaces with power-driven fasteners or concrete stub nails spaced sixteen (16) inches o.c. maximum through alternate wing flanges (staggered) of furring channel. Furring channels shall be shimmed as necessary to provide a plumb and level backing for wallboard. At inside of exterior walls, an asphalt felt protection strip shall be installed between each furring channel and the wall. Furring channel and splices shall be provided by nesting channels at least eight (8) inches and securely anchoring to concrete or masonry with two (2) fasteners in each wing.
- B. Wallboard Installation: Same as specified under Article 3.4 - "Metal Stud Partitions."

3.4 METAL STUD PARTITIONS

- A. Runner Installation: Use channel type. Align accurately at floor according to partition layout. Anchor runners securely sixteen (16) inches o.c. maximum with power-driven anchors to floor slab, with power-driven anchors to structural slab above. See "Stud Installation" below for runners over heads of metal door frames. Where required, carefully remove sprayed-on fireproofing to allow partition to be properly installed.
- B. Stud Installation
 1. Use channel type, positioned vertically in runners, spaced as noted on drawings, but not more than sixteen (16) inches o.c.
 2. Anchor studs to floor runners with screw fasteners. Provide snap-in or slotted hole slip joint bolt connections of studs to ceiling runners leaving space for movement. Anchor studs at partition intersections, partition corners and where partition abuts other construction to floor and ceiling runners with sheet metal screws through each stud flange and runner flange.
 3. Connection at ceiling runner for non-rated partitions shall be snap-in or slotted hole slip joint bolt connection that shall allow for movement. Seal studs abutting other construction with 1/8" thick neoprene gasket continuously between stud and abutting construction.

4. Connections for fire rated partitions at ceiling runners shall conform to UL Design #2079.
 5. Install metal stud horizontal bracing wherever vertical studs are cut or wallboard is cut for passage of pipes, ducts or other penetrations, and anchor horizontal bracing to vertical studs with sheet metal screws.
 6. At jambs of door frames and borrowed light frames, install doubled-up studs (not back to back) from floor to underside of structural deck, and securely anchor studs to jamb anchors of frames and to runners with screws. Provide cross braces from hollow metal frames to underside of slab.
 7. Over heads of door frames, install cut-to-length section of runner with flanges slit and web bent to allow flanges to overlap adjacent vertical studs, and securely anchor runner to adjacent vertical studs with sheet metal screws. Install cut-to-length vertical studs from runner (over heads of door frame) to ceiling runner sixteen (16) inches maximum o.c. and at vertical joints of wallboard, and securely anchor studs to runners with sheet metal screws.
 8. At control joints, in field of partition, install double-up studs (back to back) from floor to ceiling runner, with 1/4" thick continuous compressible gasket between studs. When necessary, splice studs with eight (8) inches minimum nested laps and attach flanges together with two (2) sheet metal screws in each flange. All screws shall be self-tapping sheet metal screws.
- C. Runners and Studs at Chase Wall: As specified above for "Runners" and "Studs" and as specified herein. Chase walls shall have either a single or double row of floor and ceiling runners with metal studs sixteen (16) inches o.c. maximum and positioned vertically in the runners so that the studs are opposite each other in pairs with the flanges pointing in the same direction. Anchor all studs to runner flanges with sheet metal screws through each stud flange and runner flange following requirements of paragraph 3.4, B. Provide cross bracing between the rows of studs by attaching runner channels or studs set full width of chase attached to vertical studs with one self-tapping screw at each end. Space cross bracing not over thirty-six (36) inches o.c. vertically.
- D. Wallboard Installation - Single Layer Application (Screw Attached)
1. Install wallboard with long dimension parallel to framing member and with abutting edge joints over web of framing member. Install wallboard with long dimension perpendicular to framing members above and below openings in drywall extending to second stud at each side of opening. Joints on opposite sides of wall shall be arranged so as to occur on different studs.
 2. Boards shall be fastened securely to metal studs with screws as specified. Where a free end occurs between studs, back blocking shall be required. Center abutting ends over studs. Correct work as necessary so that faces of boards are flush, smooth, true.
 3. Wallboard screws shall be applied with an electric screw gun. Screws shall be driven not less than 3/8" from ends or edges of board to provide uniform dimple

not over 1/32" deep. Screws shall be spaced twelve (12) inches o.c. in the field of the board and 8" o.c. staggered along the abutting edges.

4. All ends and edges of wallboard shall occur over screwing members (studs or furring channels). Boards shall be brought into contact but shall not be forced into place. Where ends or edges abut, they shall be staggered. Joints on opposite sides of a partition shall be so arranged as to occur on different studs.
5. At locations where piping receptacles, conduit, switches, etc., penetrate drywall partitions, provide non-drying sealant and an approved sealant stop at cut board locations inside partition.

E. Wallboard Installation - Double-Layer Application

1. General: See drawings for wallboard partition types required.
2. First Layer (Screw Attached): Install as described above for single layer application.
3. Second Layer (Screw Attached): Screw attach second layer, unless laminating method of attachment indicated on drawings or necessary to obtain required sound rating or fire rating. Install wallboard vertically with vertical joints offset thirty-four (32) inches from first layer joints and staggered on opposite sides of wall. Attach wallboard with 1-5/8" screws sixteen (16) inches o.c. along vertical joints and sixteen (16) inches o.c. in the field of the wallboard. Screw through first layer into metal framing members.
4. Second Layer (Laminated): Install wallboard vertically. Stagger joints of second layer from first layer joints. Laminate second layer with specified laminating adhesive in beads or strips running continuously from floor to ceiling in accordance with manufacturer's instructions. After laminating, screw wallboard to framing members with 1-5/8" screws, spaced twelve (12) inches o.c. around perimeter of wallboard.

F. Wallboard Installation - Laminated Application: Where laminated wallboard is indicated, use specified laminating adhesive, install wallboard vertically and maintain tolerances as specified for screw attached wallboard.

G. Insulation Installation: Install where indicated on drawings. Place blanket tightly between studs.

H. Deflection of Structure Above: To allow for possible deflection of structure above partitions, provide top runners for non-rated partitions with 1-1/4" minimum flanges and do not screw studs or drywall to top runner. Where positive anchorage of studs to top runner is required, anchorage device shall be by means of slotted hole (in clip connection with screw attachment to web of steel through bushings located in slots of clips), or other anchorage device approved by Commissioner.

I. Control Joints

1. Leave a 1/2" continuous opening between gypsum boards for insertion of surface mounted joint.
2. Back by double framing members.
3. Attach control joint to face layer with 9/16" galvanized staples six (6) inches o.c. at both flanges along entire length of joint.
4. Provide two (2) inch wide gypsum panel strip or other adequate seal behind control joint in fire rated partitions and partitions with safing insulation.

3.5 DRYWALL FASCIAS AND CEILINGS

- A. Furnish and install inserts, hanger clips and similar devices in coordination with other work.
- B. Secure hangers to inserts and clips. Clamp or bolt hangers to main runners.
- C. Space main runners 4'-0" o.c. and space hangers 4'-0" o.c. along runners, except as otherwise shown.
- D. Level main runners to a tolerance of 1/4" in 12'-0", measured both lengthwise on each runner and transversely between parallel runners.
- E. Metal Furring Channels: Space sixteen (16) inches o.c. maximum. Attach to 1-1/2" main runner channels with furring channel clips (on alternate sides of main runner channels). Furring channels shall not be let into or come in contact with abutting masonry walls. End splices shall be provided by nesting furring channels no less than eight (8) inches and securely wire tying. At any openings that interrupt the furring channels, install additional cross reinforcing to restore lateral stability.
- F. Mechanical accessories, hangers, splices, runner channels and other members used in suspension system shall be of metal, zinc coated, or coated with rust inhibitive paint, of suitable design and of adequate strength to support units securely without sagging, and such as to bring unit faces to finished indicated lines and levels.
 1. Provide special furring where ducts are over two (2) feet wide.
- G. Apply board with its long dimension at right angles to channels. Locate board butt joints over center of furring channels. Attach board with one (1) inch self-drilling drywall screws twelve (12) inches o.c. in field of board; eight (8) inches o.c. at butt joints located not less than 3/8" from edges.

3.6 SHAFT WALLS

- A. Runner Installation: Use "J" metal runners at floor and ceiling, with the short leg toward finish side of wall. Securely attach runners to structural supports with power-driven fasteners at both ends and twenty-four (24) inches o.c.
- B. Shaft Wall Liner: Cut shaft wall liner panels one (1) inch less from floor to ceiling height and erect vertically between J-runners.

12/21/2012

- C. C-H Studs: Cut metal "C-H" studs 3/8" to not more than 1/2" less than floor to ceiling height and install between shaft wall liner panels so that panels are fitted snugly into the one (1) inch wide "H" portion of the stud. Space studs twenty-four (24) inches o.c., unless otherwise indicated on drawings. Install full-length steel E-Studs or runners vertically at T-intersections, corners, door jambs, and columns. Install full length E-Studs over shaft wall liner both sides of closure panels. Frame openings cut within a liner panel with J-Runner around perimeter. For openings, frame with vertical E-Stud or runner at edges, horizontal runner at head and sill, and reinforcing as shown on the drawings. Suitably frame all openings to maintain structural support for wall. Install floor-to-ceiling steel E-Studs each side of elevator door frames to act as strut-studs. Attach strut-stud to floor and ceiling runners with two (2) 3/8" Type S screws, space twelve (12) inches o.c. Over metal doors, install a cut to length section of runner and attach to strut-studs with clip angles and 3/8" Type S Screws space twelve (12) inches o.c.
- D. Wallboard Installation - Double Layer Installation: Erect gypsum wallboard base layer horizontally one side of studs with end joints staggered. Fasten base layer panels to studs with one (1) inch Type S screws twenty-four (24) inches o.c. Caulk perimeter of base layer panels. Apply gypsum wallboard face layer vertically over base layer with joints staggered and attached with 1-5/8" Type S screws staggered from those in base, spaced eight (8) inches o.c. and driven into studs.
- E. Wallboard Installation (Where Both Sides of Shaft Wall are Finished): Apply gypsum wallboard face layers vertically both sides of studs. Stagger joints on opposite partition sides. Fasten panels with one (1) inch or two (2) inches Type S screws spaced eight (8) inches o.c. in field and along edges into studs.
- F. Where handrails are indicated for direct attachment to drywall shaft system, provide not less than a sixteen (16) ga. x eight (8) inches wide galvanized steel reinforcement strip, accurately positioned and secured to studs and concealed behind not less than one 1/2" thick course of gypsum board in the system.
- G. Integrate stair hanger rods with drywall shaft system by locating cavity of system as required to enclose rods.

3.7 ERECTION AT COLUMN ENCLOSURES

- A. Metal furring supports shall be provided under work of this Section, and shall be cut to lengths as necessary for tight fit such that spacing is not more than sixteen (16) inches o.c.
- B. Board shall be fastened securely to supports with screws as specified. Place boards in position with minimum amount of joints. Where free ends occur between supports, back-blocking or furring shall be required. Center abutting ends over supports. Correct work as necessary so that faces of boards are flush, smooth and true. Provide clips or cross furring for attachment as required.
- C. All layers shall be screw attached to furring.

- D. When column finish called for on drawings to be in the same plane as drywall finish layer, maintain even, level plane.

3.8 FINISHING

- A. Taping: A thin, uniform layer of taping compound shall be applied to all joints and angles to be reinforced. Reinforcing tape shall be applied immediately, centered over the joint, seated into the compound. A skim coat shall follow immediately, but shall not function as a fill or second coat. Tape shall be properly folded and embedded in all angles to provide a true angle.
- B. Filling: After taping compound has hardened, topping compound shall be applied, filling the board taper flush with the surface. The fill coat shall cover the tape and feather out slightly beyond the tape. On joints with no taper, the fill coat shall cover the tape and feather out at least four (4) inches on either side of the tape. No fill coat is necessary on interior angles.
- C. After topping compound is set, a finishing coat of topping compound shall be spread evenly over and extending slightly beyond the fill coat on all joints and feathered to a smooth, uniform finish. Over tapered edges, the finished joint shall not protrude beyond the plane of the surface. All taped angles shall receive a finish coat to cover the tape and taping compound, and provide a true angle. Where necessary, sanding shall be done between coats and following the final application of compound to provide a smooth surface, ready for painting.
- D. Fastener Depressions: Taping compound shall be applied to all fastener depressions followed, when hardened by at least two (2) coats of topping compound, leaving all depressions level with the plane of the surface.
- E. Finishing Beads and Trim: Taping compound shall be applied to all bead and trim and shall be feathered out from the ground to the plane of the surface. When hardened, this shall be followed by two (2) coats of topping compound each extending slightly beyond the previous coat. The finish coat shall be feathered from the ground to the plane of the surface and sanded as necessary to provide a flat, smooth surface ready for decoration.
- F. Level of finish for surface exposed to view shall conform to Level 4 of ASTM C 840 and GA-214 of the Gypsum Association.
- G. Drywall construction with defects of such character which will mar appearance of finished work, or which is otherwise defective, will be rejected and shall be removed and replaced at no expense to The City of New York.

3.9 CLEANING AND ADJUSTMENT

- A. At the completion of installation of the work, all rubbish shall be removed from the building leaving floors broom clean. Excess material, scaffolding, tools and other equipment shall be removed from the building.
- B. Work shall be left in clean condition ready for painting or wall covering. All work shall be as approved by Commissioner.

- C. Cutting and Repairing: Include all cutting, fitting and repairing of the work included herein in connection with all mechanical trades and all other trades which come in conjunction with any part of the work, and leave all work complete and perfect after all trades have completed their work.

3.10 PROTECTION OF WORK

- A. Installer shall advise Contractor of required procedures for protecting drywall work from damage and deterioration during remainder of construction period.

END OF SECTION

SECTION 093100

STONE AND TILE

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the ceramic tile as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. 3" x 6" "subway" wall tile at restrooms as shown in the drawings.
 - 2. 12" x 12" Ceramic porcelain unglazed, non skid floor tile for restrooms and pantry flooring.
 - 3. Stone saddles as shown in the drawings.
 - 4. Setting beds, grout, and sealant.

1.3 RELATED SECTIONS

- A. Construction Waste Management and Disposal - Section 017419
- B. Sustainable Design Requirements (LEED Building) - Section 018113
- C. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3
- D. Construction IAQ Requirements - Section 018119
- E. Cast in Place Concrete - Section 033000.

- F. Rough Carpentry – Section 061000.
- G. Hollow Metal Doors- Section 081113
- H. Flush Wood Doors- Section 081416
- I. Aluminum Framed Entrances and Storefront- Section 084113
- J. Gypsum drywall – Section 092500.
- K. Work in associated Divisions 21-23, 26-28

1.4 QUALITY ASSURANCE

- A. Qualifications of Installers: For cutting, installing and grouting of ceramic tile, use only thoroughly trained and experienced journeyman tile setters who are completely familiar with the requirements of this work, and the recommendations contained in the referenced standards.
- B. Codes and Standards: In addition to complying with all pertinent codes and regulations, comply with the following:
 - 1. Manufacture all ceramic tile in accordance with Standard Grade Requirements of ANSI A-137.1.
 - 2. Install all ceramic tile in accordance with the recommendations contained in Handbook for Ceramic Tile Installation of the Tile Council of America, Inc., latest edition.
- C. LEED BUILDING Performance Criteria:
The following criteria are REQUIRED for the products included in this section:
 - 1. Ceramic tile shall contain a minimum of 25% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials).
 - 2. Tiles manufactured and whose raw materials are harvested within 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements below.
 - 3. Adhesives or sealants used for work in this section shall meet the requirements of Division 1, Section 018113.3 : Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
 - 4. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.

1.5 SUBMITTALS

- A. Samples

1. Grout and tile samples to be submitted in advance for mock-up selection.
 2. Before any ceramic tile is delivered to the job site, submit to the Commissioner sample panels, approx. 12" x 12", mounted on hardboard back-up with selected grout color for each color and pattern of ceramic tile and grout specified.
- B. Master Grade Certificates: Prior to opening ceramic tile containers, submit to the Commissioner a Master Grade Certificate, signed by an officer of the firm manufacturing the ceramic tile used, and issued when the shipment is made, stating the grade, kind of tile, identification marks for tile containers, and the name and location of the project.
- C. Mock-ups
1. At an area on the site where approved by the Commissioner, provide a mock-up ceramic tile installation.
 - a. Make the mock-up approximately 3'-0" x 3'-0" in dimension.
 - b. Provide one mock-up for each type, class, and color of installation required under this Section.
 - c. The mock-ups may be used as part of the Work, and may be included in the finished Work, when so approved by the Commissioner.
 - d. Revise as necessary to secure the Commissioner's approval.
 2. The mock-ups, when approved by the Commissioner, will be used as datum for comparison with the remainder of the work of this Section for the purposes of acceptance or rejection.
 3. If the mock-up panels are not permitted to be part of the finished Work, completely demolish and remove them from the job site upon completion and acceptance of the work of this Section.
- D. LEED BUILDING Submittal Requirements
- The contractor or subcontractor shall submit the following LEED BUILDING certification items:
1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.

2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

1.6 PRODUCT HANDLING

A. Delivery and Storage

1. Deliver all materials of this Section to the job site in their original unopened containers with all labels intact and legible at time of use.
2. Store all materials under cover in a manner to prevent damage and contamination; store only the specified materials at the job site.

B. Protection: Use all means necessary to protect the materials of this Section before, during and after installation and to protect the installed work and materials of all other trades.

C. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.
- B. Vent temporary heaters to exterior to prevent damage to tile work from carbon dioxide buildup.
- C. Maintain temperatures at not less than 50 deg. F. in tiled areas during installation and for 7 days after completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS OF TILE

- A. Provide tile equal meeting these specifications. The Commissioner reserves the right to pick tile from any price group.

2.2 WALL TILE

- A. Provide 3" x 6" glazed ceramic wall tile in pattern as indicated on the drawings from the following manufactures or approved equal.

1. Sources:

- a. Acceptable Sources: Daltile, Stone Source, Nemo Tile or approved equal.

2. Grout color to match tile in value and as noted in Finish Schedule.

2.3 FLOOR TILE

- A. Provide porcelain type ceramic floor tile with all-purpose edge, 12" x 12" in size, by Daltile, Nemo, Armstrong, or approved equal. Tile to have water absorption not to exceed 0.5%, as supplied by Stone Source or approved equal.

1. Color: Basis of Design: Daltile "Desert Grey" floor Type 7 on Finish Schedule.

2. Grout color to match tile in value.

2.4 TRIM AND SPECIAL SHAPES

- A. Provide external and internal corners, trim shapes at openings, and all other trim and special shapes to match the tile specified herein, as required by field conditions and drawing details.

2.5 SETTING BEDS AND GROUT

- A. Portland Cement: ASTM C 150, Type I.

- B. Hydrated Lime: ASTM C 207, Type S.

- C. Sand: ASTM C 144, clean and graded natural sand.

- D. Latex Additives: As manufactured by Laticrete or Mapei as follows:

1. Laticrete 272 premium floor and wall thin set mortar, fortified with Laticrete 333 Mortar Admix.

2. Mapei Kerabond thin set mortar, fortified with Ker 310 Keralastic System additive.

- E. Wall and Base Tile

1. Over drywall use ANSI A136.1-1967 Organic Adhesive for installation of Ceramic Tile, Type I. Shear strength shall be 50 psi minimum. Adhesive primer as recommended by adhesive manufacturer. Manufacturer shall certify, in writing, that adhesive and primer used are proper types for the intended tile types and application. Conform to TCA Detail W-242.

- F. Floor Tile - Thin Set: Set floor tile using latex modified dry set Portland Cement mortar conforming to ANSI A118.4 and TCA Detail F-113.
- G. Stone Saddles: Granite or Limestone saddles to match ceramic floor tile in color and value. Dimensions as indicated in Drawings.
- H. Water: Clean, fresh and suitable for drinking.
- I. Grout
 - 1. For grouting ceramic tile, provide a commercial Portland cement grout made by Laticrete, Mapei, or approved equal; color as selected by the Commissioner. Add latex additive to grout made by same manufacturer as grout.
- J. Physical Properties: The setting beds and grouts must meet the following physical requirements:
 - 1. Compressive Strength – 3000 psi min.
 - 2. Shear Bond Strength – 500 psi min.
 - 3. Water Absorption – 4.0% max.
 - 4. Service Rating (ASTM C 627) – Extra Heavy Duty.

2.6 SEALANT

- A. Joint Backing: Preformed, compressible, resilient, non-extruding, non-staining strips of foam neoprene, foam polyethylene, or other material recommended by sealant manufacturer.
- B. Bond Breaker: Polyethylene tape, 3 mils thick, or other material recommended by sealant manufacturer.
- C. Sealant Primer: Colorless, non-staining, or type to suit substrate surface, as recommended by sealant manufacturer.
- D. Sealant: One-part silicone based sanitary sealant, conforming to ASTM C 920, Type S, NS, Class 25. Sealant hardness upon full cure shall be between 20-30 Shore "A" Durometer. Color of sealant to blend with or match adjacent materials, and as selected by the Commissioner. Sealant shall be equivalent to 1700 Sanitary Sealant made by General Electric or approved equal.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where ceramic tile is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 CONDITION OF SURFACES

A. Allowable Variations in Substrate Levels

1. Floors: + 1/8" in 10'-0" distance and 1/4" total max. variation from levels shown.

B. Grind or fill concrete and masonry substrates as required to comply with allowable variations.

3.3 PREPARATION

A. Coordinate the following with Section 03300:

1. Steel trowel and fine broom finish concrete slabs that are to receive ceramic tile. Cure concrete slabs that are to receive tile before tile application. Do not use liquid curing compounds or other coatings that may prevent bonding of tile setting materials to slabs. Slab shall be dry at time of tile installation.

B. Etch concrete substrate as may be required to remove curing compounds or other substances that would interfere with proper bond of setting bed. Rinse with water to remove all traces of treatment.

C. Seal substrate with sealer as recommended by manufacturer of mortar or adhesive.

3.4 JOINTS IN TILE WORK

A. Joint Widths: 1/16" wide in ceramic tile.

B. Alignment: Wall, base and floor joints shall align through the field and trim. Direction and location of all joints as directed by Commissioner.

C. Movement Joints: Conform to TCA Detail EJ171. Locate where movement joints are in back-up material. Provide movement joint at joints between mop receptors and ceramic tile. Provide movement joint at all vertical internal joints of wall tile. Movement joints 1/8" wide in ceramic tile. Fill all movement joints with specified backing and sealant. Use bond breaker where sufficient space for joint backing does not exist.

1. Provide sealant between ceramic tile and plumbing fixtures, mirrors, pipes, countertops and other dissimilar materials penetrating or adjacent to ceramic tile.

3.5 INSTALLATION

A. Comply with the following installation standards

1. Floor tile using dry set mortar - ANSI A108.5 and A108.10.

B. Allowable Variations in Finished Work: Do not exceed the following deviations from level and plumb, and from elevations, locations, slopes and alignment shown.

1. Floors: 1/8" in 10'-0" run, any direction; +/- 1/8" at any location; 1/32" offset at any location.

2. Walls: 1/8" in 8'-0" run, any direction; 1/8" at any location; offset at any location, 1/32".
 3. Joints: +/- 1/32" joint width variation of any location; 1/16" in 3'-0" run deviation from plumb and true.
- C. Handle, store, mix and apply setting and grouting materials in compliance with the manufacturer's instructions.
 - D. Extend tile work into recesses and under equipment and fixtures, to form a complete covering without interruptions. Terminate work neatly at obstructions, edges and corners without disruption of pattern or joint alignment.
 - E. 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 and fixtures so that plates, collars, or covers overlap tile.
 - F. Lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls and trim are the same size. Lay out tile work and center tile fields both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths.

3.6 CLEANING AND PROTECTION OF CERAMIC TILE

- A. Upon completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter. Unglazed tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's printed instructions, but not sooner than 14 days after installation. Protect metal surfaces, cast iron and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.
- B. Apply to all clean completed tile walls and floors a protective coating of neutral cleaner solution, 1 part cleaner to 1 part water.
- C. Leave finished installation clean and free of cracked, chipped, broken, unbonded or otherwise defective tile work.
- D. Protect installed tile work with Kraft paper or other heavy covering during construction period to prevent damage and wear. Prohibit foot and wheel traffic from using tiled floors for at least 3 days after grouting is completed. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION

SECTION 095113

ACOUSTIC PANEL CEILINGS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the acoustic panel ceilings as shown on the drawings and/or specified herein, including but not limited to, the following:
 - 1. Acoustical panel units and associated system and accessories.
 - 2. Exposed "T" suspension system, including hangers and inserts.
 - 3. Provisions for the installation of lighting fixtures, diffusers, grilles and similar items provided under other Sections.
 - 4. Cutting, drilling, scribing and fitting as required for electro-mechanical penetrations.
 - 5. Perimeter and column moldings, trim and accessories for acoustical ceilings.

1.3 RELATED SECTIONS

- A. Construction Waste Management and Disposal – Section 017419
- B. Sustainable Design Requirements (LEEDBuilding) – Section 018113
- C. Volatile Organic Compound (VOC Limits For Adhesives, Sealants, Paints And Coatings – Section 018113.3

- D. Construction IAQ Requirements – Section 018119
- E. Structural deck – Existing
- F. Steel Deck – Section 051200
- G. Rough Carpentry – Section 06100
- H. Gypsum Drywall - Section 092500.
- I. Piping, Diffusers, grilles and related frames – Divisions 21-23, 26-28
- J. Lighting fixtures – Division 26-28

1.4 QUALITY ASSURANCE

- A. Codes and Standards: In addition to complying with all pertinent codes and regulations, comply with all pertinent recommendations published by the Ceilings and Interior Systems Contractor's Association.
- B. Qualifications of Installers & Manufacturers
 - 1. The contractor or subcontractor performing the work of this section must, within the last five (5) consecutive years prior to the bid opening, have successfully completed in a timely fashion at least three (3) projects similar in scope and type to the required work.
 - 2. For the actual fabrication and installation of all components of the system, use only personnel who are thoroughly trained and experienced in the skills required and completely familiar with the requirements established for this work.
 - 3. The manufacturer providing the material or equipment specified in this section must, for the past five (5) years, have been regularly engaged in the manufacture of material or equipment similar in type to that required for this Project. Such similar material or equipment provided by the manufacturer must have been in satisfactory service for not less than five (5) years.
- C. The work is subject to the following standards:
 - 1. ASTM C 635 "Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings," American Society for Testing and Materials.
 - 2. ASTM C 636 "Standard Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels," American Society for Testing and Materials.
 - 3. FS SS-S118 requirements for type form, pattern, grade and light reflectance
- D. In addition to suspension system specified, provide seismic struts and seismic clips to meet seismic standards as required by prevailing Codes and Ordinances.

1.5 SUBMITTALS

A. LEED BUILDING Submittal Requirements:

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications.
2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION
4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the LEED Consultant for review.

B. Shop Drawings: Submit completely dimensioned ceiling layouts for all areas where acoustical ceilings are required, showing:

1. Any deviations from Commissioner's reflected ceiling plan layouts, especially lighting fixture and dimensions. Also indicate if any light fixtures will not fit into Commissioner's ceiling layout due to dimensional restrictions of field conditions.
2. Direction and spacing of suspension members and location of hangers for carrying suspension members.
3. Direction, sizes and types of acoustical units, showing suspension grid members, and starting point for each individual ceiling area.
4. Moldings or other trim or obstructions at perimeter of ceiling, at columns and elsewhere as required due to penetrations or exposure at edge of ceiling tiles.
5. Location and direction of lights, air diffusers, air slots, and similar items in the ceiling plane.
6. Details of construction and installation at all conditions.
7. Materials, gauges, thickness and finishes.

- C. Samples and Product Literature: Submit the following samples and related manufacturer's descriptive literature.

- 8. Twelve (12) inch long components of suspension systems, including moldings.

- 9. Acoustical units — full size.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination or other causes.
- B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical ceiling units carefully to avoid chipping edges or damaging units in any way.

1.7 PROJECT CONDITIONS

- A. Do not install acoustical ceilings until wet-work in space is completed and nominally dry, work above ceilings has been completed, and ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

1.8 COORDINATION

- A. Coordinate layout and installation of acoustical ceiling units and suspension system components with other work supported by or penetrating through ceilings, including light fixtures, HVAC equipment, fire suppression system components, and partition system.

1.9 EXTRA STOCK

- A. Extra Stock: Deliver stock of maintenance material to The City of New York. Furnish maintenance material matching products installed, packaged with protective covering for storage and identified with appropriate labels.

- 1. Acoustical Ceiling Units: Furnish quantity of full size units equal to 2.0% of amount installed.

PART 2 PRODUCTS

2.1 ACOUSTICAL UNITS

- A. For Dry Areas: ACT Type 1

- 1. Provide 3/4" thick, 24" x 24" mineral fiber panels equal to Durabrite Fireguard panel, Model 1912 Ultima Beveled Tegular, "Cirrus," No. 574 with square edge, as manufactured by Armstrong World Industries, or equal made by Celotex or

USG Interiors, Inc. Panels shall have factory applied white finish with light reflectance value of 0.83. Panels shall meet ASTM E 1477, Type III, Form 1, Pattern E I, Class A, with a UL flame spread rating of 0-25.

B. For Wet Areas: ACT Type 2

1. Provide 3/4" thick, 24" x 24" mineral fiber panels equal to Durabrite Fireguard non-perforated panel with vinyl facing, Model 870 Fine Fissured Ultima Beveled Tegular, "Cirrus," No. 574 with square edge, as manufactured by Armstrong World Industries, or equal made by Celotex or USG Interiors, Inc. Panels shall have factory applied white finish with light reflectance value of 0.83. Panels shall meet ASTM E 1264, Type III, Form 1, Pattern E I, Class A, with a UL flame spread rating of 0-25.

2.2 SUSPENSION SYSTEM

- A. Provide exposed "T" suspension system, steel, with low sheen white baked enamel finish equal to "Prelude," 15/16" exposed tee 2-way grid system made by Armstrong World Industries, or equal made by USG Interiors, Inc. or Chicago Metallic Corp.
- B. The suspension system shall support the ceiling assembly shown on the drawings and specified herein, with a maximum deflection of 1/360 of the span, in accordance with ASTM C 635.
- C. Hanger for suspension system shall be 1" x 3/16", galvanized steel flats or 1/4" diameter galvanized pencil rods spaced 4'-0" o.c. conforming to New York City Code requirements.
- D. Main carrying channels, to which suspension systems shall be fastened, shall be 1-1/2" cold rolled galvanized steel channel; spaced 4'-0" o.c., conforming to New York City Code requirements.
- E. Provide ceiling clips and inserts to receive hangers, type as recommended by suspension system manufacturer, sizes for pull-out resistance of not less than five (5) times the hanger design load, as indicated in ASTM C 635.
- F. Suspension systems shall conform to ASTM C 635, intermediate duty.
- G. Provide manufacturer's standard wall moldings with off-white baked enamel finish to match suspension systems. For circular penetrations of ceilings, provide edge moldings fabricated to diameter required to fit penetration exactly.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas where acoustic panel ceilings are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected to permit proper installation of the layout.

3.2 PREPARATION

- A. Coordination: Furnish layouts for inserts, clips, or other supports required to be installed by other trades for support of acoustical ceilings.
- B. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less-than-half width units at borders, and comply with reflected ceiling plans.

3.3 INSTALLATION

- A. Codes and Standards: Install materials in accordance with manufacturer's printed instructions, and to comply with governing regulations and industry standards.
- B. Install suspension systems to comply with ASTM C 636, with wire hangers supported only from building structural members. Locate hangers not more than 6" from each end, leveling to tolerance of 1/8" in 12'-0".
- C. Space rod or flat iron (New York City) hangers not more than 4'-0" o.c. along main carrying channels; attach by clips or wire ties to building structure. Locate hangers not more than 6" from each end. Space main carrying channels 4'-0" o.c. Attach suspension system to carrying channels using clips or ties, leveling to a tolerance of 1/8" in 12'-0".
- D. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum which are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal force by bracing, reinforcing, countersplaying or other equally effective means.
- E. Install edge moldings at edges of each acoustical ceiling area, and at locations where edge of acoustical units would otherwise be exposed after completion of the work.
 - 1. Secure moldings to building construction by fastening through vertical leg. Space holes not more than 3" from each end and not more than sixteen (16) inches o.c. between end holes. Fasten tight against vertical surfaces.
 - 2. Level moldings with ceiling suspension system, to a level tolerance of 1/8" in 12'-0".
- F. Install acoustical units in coordination with suspension system, with edges concealed by support of suspension members. Scribe and cut panels to fit accurately at borders and at penetrations.
- G. Install hold-down clips in toilet areas, and in areas where required by governing regulations; space 2'-0" o.c. on all cross tees.
- H. Light fixtures or other ceiling apparatus shall not be supported from main beams or cross tees if their weight causes the total load to exceed the deflection capability of the ceiling suspension system. In such cases the load shall be supported by supplemental hangers furnished and installed by this Section of work.

- I. Where fixture or ceiling apparatus installation causes eccentric loading on runners, provide stabilizer bars to prevent rotation.
- 3.4 ADJUST AND CLEAN
- A. Clean exposed surfaces of acoustical ceilings, including trim, edge molding, and suspension members; comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 096519

RESILIENT TILE FLOORING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the resilient tile flooring, as shown on the drawings and/or specified herein, including, but not limited to, the following:
 - 1. Rubber Base
 - 2. Transition strips.
 - 3. Accessories.

1.3 RELATED SECTIONS

- A. Construction Waste Management and Disposal - Section 017419
- B. Sustainable Design Requirements (LEED Building) - Section 018113
- C. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings – Section 018113.3
- D. Construction IAQ Requirements – Section 018119
- E. Cast in Place Concrete - Section 033000.

F. Rough Carpentry – Section 061000.

G. Gypsum Drywall - Section 092500.

1.4 QUALITY ASSURANCE

A. Qualifications of Installers: Use only personnel who are thoroughly trained and experienced in the skills required and completely familiar with the requirements established for this work.

B. LEED BUILDING Performance Criteria:
The following criteria are REQUIRED for the products included in this section:

1. The vinyl and linoleum flooring products shall contain recycled content as available. Products with recycled content (the percentage of recycled content is based on the weight of the component materials) shall be documented in accordance with the Submittal Requirements below.
2. Rubber flooring products shall contain at least 50% combined post-consumer and post-industrial recycled content. Products with recycled content (the percentage of recycled content is based on the weight of the component materials) shall be documented in accordance with the Submittal Requirements below.
3. Adhesives or sealants used for interior work in this section shall meet the requirements of Section 018113.3 : Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
4. Products extracted and manufactured within 500 miles (by air) of the project site shall be documented in accordance with the LEED BUILDING Submittal Requirements of this Section.
5. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.

1.5 SUBMITTALS

A. Manufacturer's Data: For information only, submit manufacturer's technical information and installation instructions for type of resilient tile.

B. Shop Drawings:

1. Submit shop drawings showing the point of origin and layout of resilient tiles in all spaces where they occur.
 - a. Identify and locate all joints where one color of type of tile meets another.

C. Samples

1. Submit full-size sample tiles for each type and color required, representative of the expected range of color and pattern variation. Sample submittals will be

reviewed for color, texture and pattern only. Compliance with all other requirements is the exclusive responsibility of the Contractor.

2. Submit six (6) inch long samples of base and strips.

D. LEED BUILDING Submittal Requirements

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

1.6 DELIVERY AND STORAGE

- A. Deliver materials to the project site in the manufacturer's original unopened containers, clearly marked to indicate pattern, gauge, lot number and sequence of materials.
- B. Carefully handle all materials and store in original containers at not less than seventy (70) degrees F. for at least forty-eight (48) hours before start of installation.

1.7 JOB CONDITIONS

- A. Continuously heat spaces to receive tile to a temperature of seventy (70) degrees F. for at least forty-eight (48) hours prior to installation, whenever project conditions are such that heating is required. Maintain seventy (70) degrees F. temperature continuously during and after installation as recommended by the tile manufacturer, but for not less than forty-eight (48) hours. Maintain a temperature of not less than fifty-five (55) degrees F. in areas where work is completed.

PART 2 PRODUCTS

2.1 BASE

- A. Provide continuous rubber base with pre-formed internal and external corner pieces, color as per Finish Schedule, manufactured by Basis of Design: AllState or Alternate Manufacturers: Nora, Roppe or approved equal.

- 1. 4" high x 1/8" thick
- 2. Base Types as per Finish Schedule

2.2 ACCESSORIES

- A. Adhesives: Waterproof, stabilized type, as recommended by the tile manufacturer for the type of service indicated.
- B. Concrete Slab Primer: Non-staining type recommended by the tile manufacturer.
- C. Leveling Compound: Latex/Portland cement flash patching and leveling compound equal to No. 226 with 3701 admixture made by Laticrete or equal made by Mapei, H.B. Fuller or approved equal.
- D. Edging Strips: 1/8" thick, homogeneous vinyl or rubber composition, tapered or bullnose edge, color as selected by the Commissioner from manufacturer's standards.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where resilient tile flooring is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 CONDITION OF SURFACES

- A. Allowable Variations in Substrate Levels (Floors): $\pm 1/8"$ in 10'-0" distance and 1/4" total maximum variation from levels shown.

- B. Grind or fill concrete and masonry substrates as required to comply with allowable variation.

3.3 PREPARATION

- A. Etch concrete substrate as may be required to remove curing compounds or other substances that would interfere with proper bond of adhesive for tile. Rinse with water to remove all traces of treatment.
- B. Perform moisture tests on concrete slabs to determine that concrete surfaces are sufficiently cured and are ready to receive tile installation.
- C. Concrete Primer: Apply concrete slab primer if recommended by tile manufacturer, prior to application of the adhesive. Apply in compliance with manufacturer's directions.

3.4 ALLOWABLE TOLERANCES

- A. Allowable Tolerances in Finished Work: Do not exceed the following deviations from level and plumb, and from elevations, locations, slopes and alignment shown.
 - 1. Floors: 1/8" in 10'-0" run, any direction; 1/32" offset at any location.

3.5 INSTALLATION

- A. Install tile only after all finishing operations, including painting, have been completed and permanent heating system is operating. Moisture content of concrete slabs, building air temperature and relative humidity must be within limits recommended by tile manufacturer.
- B. Place tile units with adhesive cement in strict compliance with the manufacturer's recommendations. Butt tile units tightly to vertical surfaces, thresholds, nosings and edgings. Scribe around obstructions and to produce neat joints, laid tight, even and in straight, parallel lines. Extend tile units into toe spaces, door reveals, and into closet and similar openings.
- C. Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on the finish tile as marked in the subfloor. Use chalk or other non-permanent marking devices.
- D. Lay tile from center marks established with principal walls, discounting minor off-sets, so that tile at opposite edges of the room are of equal width. Adjust as necessary to avoid use of cut widths less than 1/2 tile at room perimeters. Lay tile square to room axis, unless otherwise shown.
- E. Match tiles for color and pattern by using tile from cartons in the same sequence as manufactured and packaged. Cut tile neatly to and around all fixtures. Broken, cracked, chipped or deformed tile is not acceptable.

- F. Tightly cement tile to sub-base without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks through tile, or other surface imperfections.
- G. Lay tile with grain in all tile running in the same direction.
- H. Place resilient edge strips tightly butted to tile and secure with adhesive. Provide edging strips at all unprotected edges of tile, unless otherwise shown.
- I. Bases: In all spaces where base is indicated, install bases tight to walls, partitions, columns, built-in cabinets, etc., without gaps at top or bulges at bottom, with tight joints and flush edges, with molded corner pieces at internal and external corners. Provide end stops adjacent to flush type door frames and where base does not terminate against an adjacent surface. Keep base in full contact with walls until adhesive sets.

3.6 CLEANING AND PROTECTION

- A. Remove any excess adhesive or other surface blemishes from tile, using neutral type cleaners as recommended by the tile manufacturer. Protect installed flooring from damage by use of heavy Kraft paper or other covering.
- B. Finishing: After completion of the project and just prior to the final inspection of the work, thoroughly clean tile floors and accessories. Apply two (2) coats of wax and buff using materials as specified herein.

END OF SECTION

SECTION 099000

PAINTING AND FINISHING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

B LEED BUILDING - GENERAL REQUIREMENTS:

The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the painting and finishing as shown on the drawings and/or specified herein, including, but not limited to, the following:
1. Prime painting unprimed surfaces to be painted under this Section.
 2. Painting all items furnished with a prime coat of paint, including touching up of or repairing of abraded, damaged or rusted prime coats applied by others.
 3. Painting all ferrous metal (except stainless steel) exposed to view.
 4. Painting all galvanized ferrous metals exposed to view.
 5. Painting interior concrete block exposed to view.
 6. Painting gypsum drywall exposed to view.
 7. Painting of all existing surfaces.
 8. Painting pipes, pipe coverings, conduit, ducts, insulation, hangers, supports and other mechanical and electrical items and equipment exposed to view, for all items not otherwise covered under Contracts #2, 3, & 4.
 9. Painting surfaces above, behind or below grilles, gratings, diffusers, louvers, lighting fixtures, and the like, which are exposed to view through these items.

10. Incidental painting and touching up as required to produce proper finish for painted surfaces, including touching up of factory finished items.
11. Painting of any surface not specifically mentioned to be painted herein or on drawings, but for which painting is obviously necessary to complete the job, or work which comes within the intent of these specifications, shall be included as though specified.

1.3 RELATED SECTIONS

- A. Construction Waste Management and Disposal - Section 017419
- B. Sustainable Design Requirements (LEED Building) - Section 018113
- C. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings – Section 018113.3
- D. Construction IAQ Requirements – Section 018119
- E. Unit Masonry – Section 042000
- F. Masonry Restoration and Cleaning – Section 049000
- G. Miscellaneous Metals – Section 055000
- H. Steel Pan Stair – Section 055100
- I. Rough Carpentry- Section 06100
- J. Sheathing- Section 061600
- K. Access Doors – Section 083113
- L. Hollow Metal Doors – Section 081113
- M. Flush Wood Doors- Section 081416
- N. Gypsum Drywall – Section 092500
- O. Louvers and Vents – Section 089000
- P. Shop priming is required on some, but not all of the items scheduled to be field painted. Refer to other Sections of work for complete description.
- Q. Shop coat on machinery and equipment: refer to the sections under which various items of manufactured equipment with factory applied shop prime coats are furnished, including, but not necessarily limited to, the following sections. All items of equipment furnished with prime coat finish shall be finish painted under this section unless otherwise called for in divisions work in associated Divisions 21-23, 26-28
- R. Heating, ventilation and air conditioning - Division 23.

- S. Plumbing - Division 22.
- T. Color Coding of Mechanical Piping and Electrical Conduits – Divisions 21-23, 26-28.
 - 1. This Color Coding consists of an adhesive tape system and is in addition to painting of piping and conduits under this Section, as specified above.
- 1.4 MATERIALS AND EQUIPMENT NOT TO BE PAINTED
 - A. Items of equipment furnished with complete factory finish, except for items specified to be given a finish coat under this Section.
 - B. Factory-finished acoustical tile.
 - C. Non-ferrous metals, except for items specified and/or indicated to be painted.
 - D. Finished hardware, excepting hardware that is factory primed.
 - E. Surfaces not to be painted shall be left completely free of droppings and accidentally applied materials resulting from the work of this Section.
- 1.5 QUALITY ASSURANCE
 - A. Job Mock-Up
 - 1. In addition to the samples specified herein to be submitted for approval, apply in the field, at their final location, each type and color of approved paint materials, applied 10 feet wide, floor to ceiling of wall surfaces, before proceeding with the remainder of the work, for approval by the Commissioner. Paint mock-ups to include door and frame assembly.
 - 2. These applications when approved will establish the quality and workmanship for the work of this Section.
 - 3. Repaint individual areas which are not approved, as determined by the Commissioner, until approval is received. Assume at least two paint mock-ups of each color and gloss for approval.
 - B. Qualification of Painters: Use only qualified journeyman painters for the mixing and application of paint on exposed surfaces.
 - C. Paint Coordination: Provide finish coats which are compatible with the prime paints used. Review other Sections of these specifications in which prime paints are to be provided to ensure compatibility of the total coatings system for the various substrates. Upon request from other subcontractors, furnish information on the characteristics of the finish materials proposed to be used, to ensure that compatible prime coats are used. Provide barrier coats over incompatible primers or remove and re-prime as required. Notify the Commissioner in writing of any anticipated problems using the coating systems as specified with substrates primed by others.
 - D. LEED BUILDING Performance Criteria:
The following criteria are REQUIRED for the products included in this section:

1. Paints and coatings manufactured within 500 miles (by air) of the project site shall be documented in accordance with the LEED BUILDING Submittal Requirements of this Section.
2. Paints used for interior applications shall meet the volatile organic compound (VOC) and chemical component limitations of the Green Seal Paint Standards GS-11 and GC-03, of Green Seal, Inc., Washington, DC. Other architectural coatings shall meet the VOC limits as established in the South Coast Air Product-specific environmental requirements are as follows:

- a. Volatile Organic Compounds: the VOC concentrations (in grams per liter) of the product shall not exceed those listed below as determined by U. S. Environmental Protection Agency (EPA) Reference Test Method 24.

- i. Interior Paints:

Non-flat:	150 grams/liter
Flat:	50 grams/liter

- ii. Interior Anti-Corrosive Paints (if used in interior applications):

Gloss:	250 grams/liter
Semi-gloss:	250 grams/liter
Flat:	250 grams/liter

- iii. Other Interior Coatings

Clear wood finishes, floor coatings, stains, sealers, and shellacs applied to the interior shall meet the VOC limitations defined in Rule 1113, "Architectural Coatings" of SCAQMD, of the State of California. The VOC limits defined by SCAQMD, based on 7/9/04 amendments, are as follows. VOC limits are defined in grams per liter, less water and less exempt compounds.

1) Clear Wood Finishes	
a) Varnish	350
b) Sanding Sealers	350
c) Lacquer	550
2) Shellac	
a) Clear	730
b) Pigmented	550
3) Stains	250
4) Floor Coatings	100
5) Waterproofing Sealers	250
6) Sanding Sealers	275
7) Other Sealers	200

The calculation of VOC shall exclude water and tinting color added at the point of sale.

- iv Adhesives or sealants used for work in this section shall meet the

requirements of Division 1, Section 018113.3: "Volatile Organic Compound (VOC) Limits for Adhesives and Sealants", where applicable.

- v Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.

1.6 SUBMITTALS

A. Materials List

1. Before any paint materials are delivered to the job site, submit to the Commissioner a complete list of all materials proposed to be furnished and installed under this portion of the work.
2. This shall in no way be construed as permitting substitution of materials for those specified or accepted for this work by the Commissioner.

B. Samples

1. Accompanying the materials list, submit to the Commissioner copies of the full range of colors available in each of the proposed products.
2. Upon direction of the Commissioner, prepare and deliver to the Commissioner two (2) identical sets of Samples of each of the selected colors and glosses painted onto 8-1/2" x 11" x 1/4" thick material; whenever possible, the material for Samples shall be the same material as that on which the coating will be applied in the work.

- C. Manufacturer's Recommendations: In each case where material proposed is not the material specified or specifically described as an acceptable alternate in this Section of these specifications, submit for the Commissioner's review the current recommended method of application published by the manufacturer of the proposed material.

D. LEED BUILDING Submittal Requirements

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with

labor and equipment.

2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted products are the products installed in the project.
4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

1.7 PRODUCT HANDLING

- A. Deliver all paint materials to the job site in their original unopened containers with all labels intact and legible at time of use.
- B. Protection
 1. Store only the approved materials at the job site, and store only in a suitable and designated area restricted to the storage of paint materials and related equipment.
 2. Use all means necessary to ensure the safe storage and use of paint materials and the prompt and safe disposal of waste.
 3. Use all means necessary to protect paint materials before, during and after application and to protect the installed work and materials of all other trades.
- C. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

1.8 EXTRA STOCK

- A. Upon completion of this portion of the Work, deliver to The City of New York an extra stock of paint equaling approximately ten (10) percent of each color and gloss used and each coating material used, with all such extra stock tightly sealed in clearly labeled containers.

1.9 JOB CONDITIONS

- A. Apply water-based paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 50 degrees F. and 90 degrees F., unless otherwise permitted by the paint manufacturer's printed instructions.

- B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and the surrounding air temperatures are between 45 degrees F. and 95 degrees F. unless otherwise permitted by the paint manufacturer's printed instructions.
- C. Do not apply paint in snow, rain, fog or mist; or when the relative humidity exceeds eighty-five (85) percent; or to damp or wet surfaces; unless otherwise permitted by the paint manufacturer's printed instructions.
- D. Painting may be continued during inclement weather only if the areas and surfaces to be painted are enclosed and heated within the temperature limits specified by the paint manufacturer during application and drying periods.

PART 2 PRODUCTS

2.1 PAINT MANUFACTURERS

- A. Paint Types 1 & 2: Provide "Eco Spec" by Benjamin Moore Paints, or "Harmony" by Sherwin Williams, or approved equal. Comply with number of coats and required minimum mil thicknesses as specified herein. Names used herein are those of Benjamin Moore or Sherwin Williams; equivalent paint of listed manufacturers or others are acceptable subject to the approval of the Commissioner.
- B. Paint Type 3: Provide "Latex Floor and Patio Enamel 122" by Benjamin Moore Paints or "Industrial Enamel" by Sherwin Williams or approved equal.

2.2 MATERIALS

- A. Provide undercoat paint produced by the same manufacturer as the finish coats. Use only thinners approved by the paint manufacturer, and use only to recommended limits.
- B. Colors and Glosses: Paint Types as shown in the finish schedule.
 - 1. Colors:
 - a. Paint Type 1: *White Dove*
 - b. Paint Type 1: *Super White*
 - c. Paint Type 3: *White*
- C. Coloring Pigment as may be required: Products of or furnished by the manufacturer of the paint or enamel approved for the work.
- D. Linseed Oil: Raw or boiled, as required, of approved manufacture, per ASTM D 234 and D 260, respectively.
- E. Turpentine: Pure distilled gum spirits of turpentine, per ASTM D 13.
- F. Shellac: Pure gum shellac (white or orange) cut in pure denatured alcohol using not less than four (4) lbs. of gum per gallon of alcohol.
- G. Driers, Putty, Spackling Compound, Patching Plaster, etc.: Best quality, of approved manufacture.

- H. Heat Resistant Paint: Where required, use heat resistant paint when applying paint to heating lines and equipment.

2.3 GENERAL STANDARDS

- A. The various surfaces shall be painted or finished as specified below in Article 2.4. However, the Commissioner reserves the right to change the finishes within the range of flat, semi-gloss or gloss, without additional cost to The City of New York.
- B. All paints, varnishes, enamels, lacquers, stains and similar materials must be delivered in the original containers with the seals unbroken and label intact and with the manufacturer's instructions printed thereon.
- C. All painting materials shall bear identifying labels on the containers with the manufacturer's instructions printed thereon.
- D. Paint shall not be badly settled, caked or thickened in the container, shall be readily dispersed with a paddle to a smooth consistency and shall have excellent application properties.
- E. Paint shall arrive on the job color-mixed except for tinting of under-coats and possible thinning.
- F. All thinning and tinting materials shall be as recommended by the manufacturer for the particular material thinned or tinted.
- G. It shall be the responsibility of the Contractor to see that all mixed colors match the color selection made by the Commissioner prior to application of the coating.

2.4 SCHEDULE OF FINISHES

- A. Ferrous Metals (primer not required on shop-primed items; touch-up as required)

First Coat: BM P29 Direct to Metal Acrylic.
Second Coat: BM MoorGlo Latex House & Trim paint N096.
Third Coat: Same as Second Coat.

or

First Coat: SW EnviroSpec DTM Acrylic Coating.
Second Coat: SW Semi-gloss, EnviroSpec Aquaclad Water based Alkyd.
Third Coat: Same as Second Coat.

- B. Interior Ferrous Metal

Semi-Gloss Finish/Enamel

Primer: 1 coat Acrylic Metal Primer (P04), or touch-up shop primer
First Coat: 1 coat Pristine Eco Spec Interior Latex Enamel (N376)
Second Coat: 1 coat Pristine Eco Spec Interior Latex Enamel (N376)
Total DFT not less than: 3.0 mils

Semi-Gloss Finish/Alkyd

Primer: 1 coat EnviroSpec DTM Acrylic Coating
First Coat: 1 coat Harmony Interior Latex Semi-Gloss B10 Series
Second Coat: 1 coat Harmony Interior Latex Semi-Gloss B10 Series
Total DFT not less than: 4.0 mils

C. Interior Drywall

Flat Finish/Vinyl Acrylic Latex

Primer: 1 coat Harmony Interior Latex Primer B11W900
First Coat: 1 coat Harmony Interior Latex Flat B5 Series
Second Coat: 1 coat Harmony Interior Latex Flat B5 Series
Total DFT not less than: 3.6 mils

or

Flat Finish/Vinyl Acrylic Latex

Primer: 1 coat Pristine Eco Spec Primer / Sealer First Coat (N372)
First Coat: 1 coat Pristine Eco Spec Interior Latex Flat (N373)
Second Coat: 1 coat Pristine Eco Spec Interior Latex Flat (N373)
Total DFT not less than: 2.0 mils

Eggshell Acrylic Latex Enamel

Primer: 1 coat Pristine Eco Spec Primer / Sealer First Coat (N372)
First Coat: 1 coat Pristine Eco Spec Interior Latex eggshell enamel (N374)
Second Coat: 1 coat Pristine Eco Spec Interior Latex eggshell enamel (N374)
Total DFT not less than: 2.2 mils

- D. Pavement Marking Paint: Factory-mixed, quick-drying non-bleeding paint specifically formulated for marking surfaces, blue color equal to "Setfast Acrylic Waterborne Traffic Marking Paint (TM226)" made by Sherwin Williams, P58 by Benjamin Moore, or approved equal.

1. Comply with all ADA requirements.

2.5 EXISTING SURFACES TO BE PAINTED

- A. Existing surfaces shall be painted in accordance with schedule given in Article 2.4 herein except that first or prime coat may be eliminated where existing paint is sound. Where existing paint must be removed down to base material, provide first or prime coat as specified.

2.6 PIPING AND MECHANICAL EQUIPMENT EXPOSED TO VIEW

- A. Paint all exposed piping, conduits, ductwork and mechanical and electrical equipment. Use heat resisting paint when applied to heating lines and equipment. The Contractor is cautioned not to paint or otherwise disturb moving parts in the mechanical systems. Mask or otherwise protect all parts as required to prevent damage.

- B. Exposed Uncovered Ductwork, Piping, Hangers and Equipment: Latex Enamel Undercoater and one (1) coat Acrylic Latex Flat.
- C. Exposed Covered Piping, Duct Work and Equipment: Primer/Sealer and one (1) coat Acrylic Latex Flat.
- D. Panel Boards, Grilles and Exposed Surfaces of Electrical Equipment: Latex Enamel Undercoater and two (2) coats Latex Semi-Gloss.
- E. Equipment or Apparatus with Factory-Applied Paint: Refinish any damaged surfaces to match original finish. Do not paint over name plates and labels.
- F. All surfaces of insulation and all other work to be painted shall be wiped or washed clean before any painting is started.
- G. All conduit, boxes, distribution boxes, light and power panels, hangers, clamps, etc., are included where painting is required.
- H. All items of Mechanical and Electrical trades which are furnished painted under their respective Contracts shall be carefully coordinated with the work of this Section so as to leave no doubt as to what items are scheduled to be painted under this Section.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where painting and finishing are to be applied and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 GENERAL WORKMANSHIP REQUIREMENTS

- A. Only skilled mechanics shall be employed. Application may be by brush or roller. Spray application only upon acceptance from the Commissioner in writing.
- B. The Contractor shall furnish the Commissioner a schedule showing when he expects to have completed the respective coats of paint for the various areas and surfaces. This schedule shall be kept current as the job progresses.
- C. The Contractor shall protect his work at all times, and shall protect all adjacent work and materials by suitable covering or other method during progress of his work. Upon completion of the work, he shall remove all paint and varnish spots from floors, glass and other surfaces. He shall remove from the premises all rubbish and accumulated materials of whatever nature not caused by others and shall leave his part of the work in clean, orderly and acceptable condition.
- D. Remove and protect hardware, accessories, device plates, lighting fixtures, and factory finished work, and similar items, or provide ample in place protection. Upon completion of each space, carefully replace all removed items by workmen skilled in the trades involved.

- E. Remove electrical panel box covers and doors before painting walls. Paint separately and re-install after all paint is dry.
- F. All materials shall be applied under adequate illumination, evenly spread and flowed on smoothly to avoid runs, sags, holidays, brush marks, air bubbles and excessive roller stipple.
- G. Coverage and hide shall be complete. When color, stain, dirt or undercoats show through final coat of paint, the surface shall be covered by additional coats until the paint film is of uniform finish, color, appearance and coverage, at no additional cost to The City of New York.
- H. All coats shall be dry to manufacturer's recommendations before applying succeeding coats.
- I. Do not apply paint behind frameless mirrors that use mastic for adhering to wall surface.

3.3 PREPARATION OF SURFACES

- A. Existing Surfaces: Clean existing surfaces requiring paint or finishing, remove all loose and flaking paint or finish and sand surface smooth as required to receive new paint or finish. No "telegraphing" of lines, ridges, flakes, etc., through new surfacing is permitted. Where this occurs, Contractor shall be required to sand smooth and re-finish until surface meets with Commissioner's approval.
- B. General
 - 1. The Contractor shall be held wholly responsible for the finished appearance and satisfactory completion of painting work. Properly prepare all surfaces to receive paint, which includes cleaning, sanding, and touching-up of all prime coats applied under other Sections of the work. Broom clean all spaces before painting is started. All surfaces to be painted or finished shall be perfectly dry, clean and smooth.
 - 2. Perform all preparation and cleaning procedures in strict accordance with the paint manufacturer's instructions and as herein specified, for each particular substrate condition.
 - 3. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease with clean cloths and cleaning solvents prior to mechanical cleaning. Program the cleaning and painting so that dust and other contaminants from the cleaning process will not fall in wet, newly painted surfaces.
- C. Metal Surfaces
 - 1. Weld Fluxes: Remove weld fluxes, splatters, and alkali contaminants from metal surfaces in an approved manner and leave surface ready to receive painting.
 - 2. Bare Metal: Thoroughly clean off all foreign matter such as grease, rust, scale and dirt before priming coat is applied. Clean surfaces, where solder flux has been

used, with benzene. Clean surfaces by flushing with mineral spirits. For aluminum surfaces, wipe down with an oil free solvent prior to application of any pre-treatment.

3. Shop Primed Metal: Clean off foreign matter as specified for "Bare Metal." Prime bare, rusted, abraded and marred surfaces with approved primer after proper cleaning of surfaces. Sandpaper all rough surfaces smooth.
 4. Galvanized Metal: Prepare surface as per the requirements of ASTM D 6386.
 5. Metal Filler: Fill dents, cracks, hollow places, open joints and other irregularities in metal work to be painted with an approved metal filler suitable for the purpose and meeting the requirements of the related Section of work; after setting, sand to a smooth, hard finish, flush with adjoining surface.
- D. Gypsum Drywall Surfaces: Scrape off all projections and splatters, spackles all holes or depressions, including taped and spackled joints, sand smooth. Conform to standards established in Section 09250 Gypsum Drywall.
- E. Block Masonry Surfaces: Thoroughly clean off all grit, grease, dirt mortar drippings or splatters, and other foreign matter. Remove nibs or projections from masonry surfaces. Fill cracks, holes or voids, not filled under the "Masonry" Section, with Portland cement grout, and bag surface so that it has approximately the same texture as the adjacent masonry surface.
- F. Testing for Moisture Content: Contractor shall test all plaster, masonry, and drywall surfaces for moisture content using a reliable electronic moisture meter. Contractor shall also test latex type fillers for moisture content before application of top coats of paint. Do not apply any paint or sealer to any surface or to latex type filler where the moisture content exceeds seven (7) percent as measured by the electronic moisture meter.
- G. Touch-Up: Prime paint all patched portions in addition to all other specified coats.
- 3.4 MATERIALS PREPARATION
- A. Mix and prepare painting materials in strict accordance with the manufacturer's directions.
 - B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing, and application of paint in a clean condition, free of foreign materials and residue.
 - C. Stir all materials before application to produce a mixture of uniform density, and as required during the application of the materials. Do not stir any film which may form on the surface into the material. Remove the film and, if necessary, strain the material before using.
 - D. Tint each undercoat a lighter shade to facilitate identification of each coat where multiple coats of the same material are to be applied. Tint undercoats to match the

color of the finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

3.5 APPLICATION

A. General

1. Apply paint by brush or roller in accordance with the manufacturer's directions. Use brushes best suited for the type of material being applied. Use rollers of carpet, velvet back, or high pile sheep's wool as recommended by the paint manufacturer for material and texture required.
2. The number of coats and paint film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has completely dried. Sand between each enamel or varnish coat application with fine sandpaper, or rub surfaces with pumice stone where required to produce an even, smooth surface in accordance with the coating manufacturer's directions.
3. Apply additional coats when undercoats, stains, or other conditions show through the final coat of paint, until the paint film is of uniform finish, color and appearance. Give special attention to insure that all surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a film thickness equivalent to that of flat surfaces.
4. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - a. "Exposed surfaces" is defined as those areas visible when permanent or built-in fixtures, convector covers, covers for finned tube radiation, grilles, etc., are in place in areas scheduled to be painted.
5. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint, before final installation of equipment.
6. Paint the back sides of access panels, removable or hinged covers to match the exposed surfaces.
7. Finish doors on tops, bottoms, and side edges the same as the faces, unless otherwise indicated.
8. Enamel finish applied to wood or metal shall be sanded with fine sandpaper and then cleaned between coats to produce an even surface.
9. Paste wood filler applied on open grained wood after beginning to flatten, shall be wiped across the grain of the wood, then with a circular motion, to secure a smooth, filled, clean surface with filler remaining in open grain only. After overnight dry, sand surface with the grain until smooth before applying specified coat.

B. Scheduling Painting

1. Apply the first coat material to surfaces that have been cleaned, pre-treated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
 2. Allow sufficient time between successive coatings to permit proper drying. Do not re-coat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
- C. Prime Coats: Re-coat primed and sealed walls and ceilings where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.
- D. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage.
- E. "Touching-Up" of Factory Finishes: Unless otherwise specified or shown, materials with a factory finish shall not be painted at the project site. To "touch-up," the Contractor shall use the factory finished material manufacturer's recommended paint materials to repair abraded, chipped, or otherwise defective surfaces.

3.6 PROTECTION

- A. Protect work of other trades, whether to be painted or not, against damage by the painting and finishing work. Leave all such work undamaged. Correct any damages by cleaning, repairing or replacing, and repainting, as acceptable to the Commissioner.
- B. Provide "Wet Paint" signs as required to protect newly painted finishes. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.

3.7 CLEAN UP

- A. During the progress of the work, remove from the site all discarded paint materials, rubbish, cans and rags at the end of each work day.
- B. Upon completion of painting work, clean window glass and other paint spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.
- C. At the completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

END OF SECTION

SECTION 099200

BREATHABLE MASONRY COATING

PART 1 – GENERAL

- A. The general provisions and special provisions of these specifications are hereby made a part of this section and will be read by each subcontractor.
- B. Cooperate and coordinate all other trades in executing the work described in this section.
- C. **LEED BUILDING - GENERAL REQUIREMENTS:**
The City of New York requires the Contractor to implement practices and procedures to meet the Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.1 SCOPE OF WORK

- A. The work described in this section consists of furnishing all labor and materials and performing all operations in connection with the cleaning and/or surface preparation and painting on the existing masonry surfaces.
- B. Graphic mural art painted after base coat is applied. Digital files will be provided by the Commissioner to facilitate the layout of graphic artwork.
- C. All materials and equipment necessary to complete the work in accordance with the documents.
- D. Protection of adjacent construction and site.
- E. Coordination and compatibility with cleaning and preparation treatments specified elsewhere.
- F. A water-based breathable silicone resin emulsion paint (SREP) developed for application to new or old masonry surfaces and compatible for use over the existing paint coating is also described. Applied by brush, roller, or low pressure spray, the paint system dries to a flat finish.

Surfaces properly treated with the specified coating system will be rendered uniform in color and water repellent without substantial reduction of the treated masonry's natural water vapor permeability. The coating provides superior protection against atmospheric staining, efflorescence, mildew staining and paint failure that results from moisture intrusion.

- G. Use of nonproprietary surface prep materials, primers, surface treatments or paint coatings other than those specified herein will not be permitted.

1.2 RELATED UNDER OTHER SECTIONS

- A. Construction Waste Management And Disposal - Section 017419
- B. Sustainable Design Requirements (LEED Building) - Section 018113
- C. Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints And Coatings - Section 018113.3
- D. Construction IAQ Requirements – Section 018119
- E. Unit Masonry – Section 042000
- F. Masonry Restoration and Cleaning – Section 049000
- G. Aluminum Framed Entrances and Storefront– Section 084113
- H. Aluminum Windows and Doors – Section 085113
- I. Glass and Glazing – Section 088000

1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturers shall have been regularly engaged and specializing for the preceding three (3) years in the formulation, manufacture and distribution of surface treatments and silicone emulsion paint coatings for masonry substrates.
- B. Contractor Qualifications: Contractors shall have been regularly engaged and specializing for the preceding three (3) years in the application of painted mural artwork on masonry facades. Contractors shall possess all necessary licenses, certifications, or other written approvals as required by the manufacturer supplying coating materials necessary for execution of the work specified in this section.
- C. Regulatory Requirements: All activities shall be in compliance with relevant local codes and governmental regulations.
- D. Tests and Approvals:
 - 1. Test areas of at least 100 square feet will be selected by the Commissioner to represent the appearance of the final project.

2. The test areas will be cleaned and prepared as necessary using specified methods for inspection and approval of the Commissioner or project manager prior to application of the coating samples.
3. Samples of the coating will then be applied to test areas on each surface exposure on representative surface conditions, employing techniques and equipment proposed for overall application.
4. Adjacent surfaces not to be treated will be tested for possible detrimental effect or aesthetic alteration created by exposure to the specified finish coat. Protect as necessary.
5. Test applications will be carefully monitored to determine the appropriate square foot coverage rates to be maintained throughout the job application.
6. The testing process shall be carried out by the actual applicators designated to apply the general treatment. Testing shall be supervised by a representative of the material manufacturer. Tests shall serve as a review of the appropriate application procedures and consumption rates.
7. The Commissioner or project manager will approve all test areas and application procedures prior to the state of full-scale operations.
8. Test procedures shall include evaluation of materials and techniques proposed for protection of surrounding and adjacent nonmasonry surfaces from treatments.
9. Completed and approved test areas shall serve as the standard by which all subsequent work in this section will be judged.

1.4 SUBMITTALS

A. LEED BUILDING Submittal Requirements:

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications.
2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION
4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data

Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the LEED Consultant for review.
- B. Product Information: Contractor shall review all written product data sheets and container labels supplied by the product manufacturer.

Contractor shall review all special requirements outlined in this document and those outlined by the Commissioner. The contractor shall verify in writing, to the appropriate representative of the Commissioner, that such product information and special requirements are understood before initiating general application.
- C. Shop Drawings: Shop drawings for the installation of painted exterior mural. Include elevations at not less than 1/2" to 1'-0" scale. Lay out building graphic on all building elevations for approval and as shown in Contract Drawings.
- D. Color samples of each color specified.
- E. Mock-Up: Area no less than 10' x 10' showing all typical conditions including but not limited to a building corner and masonry opening and associated window graphic. If approved, the Mock-Up may be incorporated into the final project.
- F. Test Reports: When directed by the Commissioner, the contractor shall submit laboratory test reports confirming the physical and chemical characteristics of materials used in the performance of work outlined in this section.
- G. Warranty Test Reports: If a 10 Year Material & Labor Warranty is required, follow the manufacturer's procedures for measuring, documenting and reporting the comparison of treated and untreated test areas. Test the rates of water penetration before application of breathable masonry coating, and when the coating application is completed. Following manufacturer's instructions for application of breathable masonry coating, test adhesion using ASTM D-3359 Standard Method for Measuring Adhesion by Tape Test. Submit test reports to the Commissioner.

1. Pretreatment Rilem Tube Tests:

- a. Rilem Tube Testing: prior to installation of the water repellent, conduct Rilem Tube test using the procedure provided by the coating manufacturer and report the results for untreated masonry to the Commissioner.
- b. Fill the tube with water to appropriate level; wait 20 minutes and then record the amount water absorbed by the substrate.
- c. Use 5.0 mL tubes for testing brick, stone and cured concrete; use 60 mph tubes for testing concrete block. A sales manager or manufacturer's representative of the water repellent company should conduct Rilem tube tests.

2. Post-treatment Rilem Tube Tests:

- a. Following installation of the water repellent, conduct Rilem Tube test using the procedure provided by the coating manufacturer and report the results for treated masonry to the Commissioner.
 - b. Fill the tube with water to appropriate level; wait 20 minutes and then record the amount of water absorbed by the substrate.
 - c. Use 5.0 ml tubes for testing brick, stone and cured concrete substrates; use 60 mph tubes for testing concrete block. A sales manager or manufacturer's representative of the water repellent company should conduct Rilem tube tests.
3. Adhesion Test: ASTM D-3359 Measuring Adhesion by Tape Test. Allow coating to cure for no less than 14 days before conducting field adhesion tests.

H. Other Submittals:

1. Procedures: Contractor shall document, in writing, the procedures used in the preparation of the test area(s) described under Tests and Approvals of this section. Include the following information:
 - a. Environmental conditions; including temperature, relative humidity, wind conditions and sun exposure.
 - b. Finish coats used, including number of applications and methods of applications.
 - c. Application equipment used, including application pressures.
 - d. Accessory materials used.
 - e. Color samples to match digital files provided by the Commissioner.
- I. Upon approval of such documentation by Commissioner, the submitted procedures and test results will serve as the standard by which all subsequent work in this section will be judged.
- J. Inspection Reports: Before initiating general application, the contractor shall submit a report of his inspection of any exterior pre -cast and poured in place concrete designated to receive treatment to the appropriate representative of the Commissioner. This report shall include the following information:
 1. Inspection methods employed.
 2. Description of existing conditions, including any staining or deposits present on the concrete surfaces which might affect the appearance or performance of the specified treatments.

3. Description of any additional work necessary to effectively carry out the treatment specified in this section.
4. Cost proposals for execution of such additional work.
5. In the event that recommendations for surface preparations and coating involve materials and procedures not specified in this section or accompanying sections, include with the inspection report all relevant product data, procedures and test reports.

Following submittal of the above-described documents, the contractor shall request a written "Order to Proceed" from the Commissioner before initiating general application of the specified treatments to each façade designated to receive treatment.

1.5 WARRANTY

- A. The Contractor shall warrant that all Breathable Masonry Coating Work executed under this Section will be free from defects in materials and workmanship for a period of two (2) years from date of acceptance of the Project, and he shall remedy any defects in the Breathable Masonry Coating Work.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Materials to be used in performance of work outlined in this section shall be delivered to the site in the manufacturer's original, unopened containers. Each container shall bear the manufacturer's label in legible condition.
- B. Storage: All materials shall be stored at the job site in a secure storage area approved by the Commissioner. Protect the materials from adulteration by infiltration. Materials shall be stored off-ground and, as required, under cover.

Conform to any additional recommendations of the manufacturer regarding storage and handling of the materials.

- C. Replacements: In the event of adulteration of the materials, or the rejection of the materials by the Commissioner for nonconformance, the contractor shall be responsible for replacing such materials at no additional cost and in a manner causing no delay in the commencement and performance of the work.

Make assurance that the storage life of the breathable masonry coating has not been exceeded. a limited storage life of one year. The breathable masonry coating should be stored in sealed containers, kept away from extreme heat and protected from freezing.

1.7 PROJECT CONDITIONS

- A. Environmental Requirements:

1. Surfaces designated to receive treatment with breathable masonry coating work must possess a surface temperature of not less than 40° F and not greater than 85° F.
2. Treatments shall not be applied during rain, to wet surfaces or when there is a chance of rain within 24 hours after application unless such surfaces are properly protected from rain waters.
3. Cleaning materials and treatments shall not be applied when winds are sufficient to carry airborne chemicals to unprotected surfaces.

B. Occupancy:

1. Contractor shall arrange with the Commissioner for means of access to the premises and necessary utilities, space for storage of materials and equipment, etc.
2. Contractor shall provide covered access to portions of the building undergoing the specified treatment at all times for designated employees of the Commissioner and the product manufacturer.

PART 2 – PRODUCTS

2.1 MANUFACTURER(S)

- A. Surface preparation cleaner specified elsewhere, and silicone resin emulsion paint, shall be produced by the same manufacturer.
- B. Use of materials other than those outlined in this section shall require the advance, written approval of the Commissioner.

2.2 MATERIALS

A. Breathable Masonry Coating – Color coat:

Breathable masonry coating will be a silicone resin emulsion paint (SREP) with the protective power of breathable water repellents. The coating must allow water vapor escape from masonry, while stopping destructive liquid water from entering and preserving the masonry's appearance.

1. Acceptable Products

- a. Basis of Design: Prosoco Breathable Masonry Coating II

pH: 9.0 -10.0

FLASH POINT: > 200 degrees F (> 93 degrees C) ASTM D 3278

FREEZE POINT: 32 degrees F (0 degrees C) Do not freeze.
BINDER: Silicone resins, acrylic resins
GENERIC TYPE: Silicone emulsion color coating
DRYING TIME: (Normal 77 degrees F, 50% Relative Humidity)
Touch: 45 minutes
Recoat: 24 hours
TYPE OF CURE: Coalescence
REDUCTION SOLVENT: Water
CLEAN UP SOLVENT: Water
VOC CONTENT: Complies with all known national, state and district
AIM VOC regulations.

- b. Alternate Manufacturers:
 - a. Edison Coatings, Inc Elastowall 351
 - b. Tnemec Enviro-Crete 156 & 157 & Tnemec-Cryl Series 6.
 - c. Or approved equal meeting the same standards.

2. Color and Artwork

- a. Digital files will be provided to the successful bidder for their use in laying out the work.
- b. A precise color match will be required.

B. Graffiti Coatings:

- 1. Basis of Design: Prosoco "Sacrificial Coating SC-1"
- 2. Alternate Manufacturers:
 - a. Edison Coatings, Inc Aquathane UA-210.
 - b. Fox Industries FX-441
 - c. or approved equal.

2.3 OTHER MATERIALS

- A. Other materials not specifically described, but required for complete and proper performance of work outlined in this section, shall be new, first quality of their respective kinds, and subject to approval by the Commissioner.

PART 3 – EXECUTION

3.1 INSPECTION

- A. Verify that the work outlined in this section can be carried out in accordance with all relevant local codes and governmental regulations, and the Contract Documents.
- B. Submit an inspection report as described under Other Submittals: Inspection Reports of this section, reviewing the condition of the exterior concrete and the work proposed in

this section. Provide platforms, scaffolding, ladders and tools required to perform comprehensive inspections.

3.2 PROTECTION

- A. Nonmasonry surfaces, wooden and/or painted surfaces not intended for treatment shall be protected with drop cloths, sheets of polyethylene, or other proven protective materials firmly fixed and sealed to the surface.
- B. Provide for the removal and subsequent reinstallation of surface mounted items where practical. Where not practical, such items shall be protected in place.
- C. Adjoining glass, metal and painted surfaces shall be protected from overspray and splash of the coating. Inadvertent splashes should be removed before the solution has dried on the surface.

3.3 PREPARATION

- A. Surface cracks and voids of more than 1/16" shall be re-pointed, patched or caulked as specified prior to application of the primer.
- B. All caulking and sealants shall be in place and thoroughly cured prior to application.
- C. The concrete surface(s) shall be cleaned free of all surface dirt, efflorescence, dust, oil or other surface contaminants, using the methods and surface preparation cleaner specified. Allow prepared surfaces to dry thoroughly before application of the color coat.
- D. All existing painted surfaces intended to be re-coated shall first be power washed using cold water pressure rinsing equipment. Equipment shall be adjustable and allow for pressures of 800 psi to 1000 psi at the wall, with 4-6 gallons of water per minute with a 15- 45° tip. This process is designed to remove all loose surface debris, insects, dust, dirt, and loose and peeling paint.
- E. Following pressure rinsing, surfaces shall be cleaned with a compatible masonry cleaner as specified elsewhere and described below.
- F. Installers shall inspect all surfaces to verify that they are properly prepared to receive the specified coating system. On-site tests should be conducted to ensure proper adhesion. Application shall not proceed until all unsatisfactory conditions have been corrected.
- G. Coordinate necessary closure of the building entrances, walkways, and other pedestrian areas with the Commissioner.

3.4 EQUIPMENT

- A. 4" – 6" nylon brushes with 3 ¾ " exposed stack
- B. Application rollers with ¾ - 1 ¼" nap.

- C. Personal protective gear, including safety goggles, rubber gloves, plastic or rubber rain suits, etc., as recommended in the manufacturer's product literature and label and Material Safety Data Sheet.
- D. Conventional airless spray equipment suitable for applying acrylic latex-type paints.
- E. High pressure rinsing equipment. Equipment must be adjustable and provide from 800 psi to 1000 psi with 4 to 6 gallons of water per minute delivered through a 15 - 45° fan spray tip.

3.5 CLEANING PREPARATION

- A. Clean and prepare masonry surface as required by the manufacture of the breathable masonry coating and as part of masonry cleaning specifications elsewhere.

Before applying, read "Protect" and "Precautionary Measures" sections in the manufacturer's Product Data Sheet for surface cleaner. Use in concentrate on severe staining, or dilute with up to 10 parts water on light staining. Refer to Product Data Sheet for recommended dilution for intended use.

1. Prewet the surface with clean water.
2. Apply the cleaner to all surfaces designated to receive breathable masonry coating using a brush or low-pressure spray.
3. Let the cleaner stay on the surface 1-10 minutes. Do not allow cleaner to dry. If drying occurs, lightly wet surfaces with fresh water.
4. Re-apply the cleaner and scrub heavily soiled areas using a plastic or brass bristle scrub brush.
5. Rinse the surface thoroughly with clean water. Remove all cleaner, loose material and debris.
6. Repeat steps 1 through 5 if necessary.

Note: and reapply the cleaner in a gentle scrubbing manner.

3.6 APPLICATION

Before applying, read "Protect" and "Precautionary Measures" sections in the manufacturer's Product Data Sheet for breathable masonry coating. Refer to the Product Data Sheet for additional information about application. Do not dilute or alter except for use in sprayers. The concentrate may be thinned with up to 5 percent fresh water, based on surface and drying conditions, and equipment.

Tinting

The breathable masonry coating must be compatible with an appropriate color system for achieving predictable color matches.

Application Instruction

1. Mix tinted base coat well.

2. Use roller, brush or airless sprayer to apply a smooth, uniform coating, 7 wet mils thick. Work from the top down. Brush out runs or drips. Back roll spray applications for proper adhesion and good coating performance.
3. Let first coat dry 24 hours
4. Reapply. The second coat should be 4 wet mils thick.
5. Protect from rain for at least 6 hours or until coating is thoroughly dry. Coating dries completely in 48 hours.

3.7 FIELD QUALITY CONTROL

- A. Inspection: Inspect the work with the Contractor, Commissioner, applicator, and manufacturer's representative, and compare with test panel results approved by the Commissioner. Determine if the substrates are suitably protected by the water repellents.
- B. Manufacturer's Field Services: Provide the services of a manufacturer's authorized field representative to verify specified products are used, and protection, surface preparation, and application of water repellents are in accordance with the manufacturer's written instructions and the test panel results approved by the Commissioner.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 099646

INTUMESCENT FIREPROOFING

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment, and services necessary to complete the intumescent fireproofing on exposed to view fireproofed steel ,as indicated on drawings and as specified herein, including, but not limited to, the following:
 - 1. Intumescent fireproofing on structural steel members as noted in the drawings.

1.3 RELATED SECTIONS

- A. Construction Waste Management and Disposal - Section 017419
- B. Sustainable Design Requirements (LEED Building) - Section 018113
- C. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3
- D. Construction IAQ Requirements - Section 018119
- E. Structural steel - Section 051200.
- F. Folding Doors- Section 083510
- F. Aluminum Entrances and Storefronts- Section 084113

G. Aluminum Windows and Doors- Section 085113

J. Painting and Finishing- Section 099100.

L. Related work in Divisions 21-23 and 26-28

1.4 REFERENCES

- A. Publications listed herein are part of this specification to the extent referenced.
- B. American Society for Testing and Materials: ASTM E 119 Method for Fire Tests of Building Construction and Materials.
- C. Warnock Hersey - 2001 Certification Listings.
- D. Under Writers Laboratories, Inc. - List of Equipment and Materials.
- E. Steel Structures Painting Council (SSPC) Surface Preparation Standards.

1.5 SYSTEM DESCRIPTION

- A. Performance Requirements: Intumescent fireproofing shall provide fire resistance compliance with requirements of the New York City Building Code.
- B. Material must have approval for use in New York City.

1.6 SUBMITTALS

A. LEED BUILDING Submittal Requirements

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 Sustainable Design Requirements(LEED Building) of these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. The manufacturing location for the product(s); and the location (source) of the raw materials used to manufacture the product(s).
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment.
2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as

confirmation that the submitted products are the products installed in the project.

4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

A. Product Data

1. Submit manufacturer's literature describing product characteristics, performance, and limitation criteria, including thickness for typical shape, curing time and application sequence.
2. The Commissioner will choose a top coat color in a satin finish which the manufacturer will match.
3. Submit schedule of material thickness for members to receive intumescent.

B. Samples

1. Submit two (2) samples of the intumescent fireproofing.
2. The manufacturer shall provide stepped samples applied to the same material as the finished installation. The first or lowest layer is the specified primer. The middle layer is the intumescent fireproofing. The top coat is an aliphatic polyurethane enamel protective top coat. The finished application will have a smooth paint like finish.

C. Mock Up: Provide 3'0" mock up of intumescent paint system including finish coating.

D. Quality Assurance Submittals

1. Test Designs/Results: Submit test designs for intumescent fireproofing prepared by a nationally recognized, certified, independent testing laboratory indicating full compliance with specified fire resistance performance requirements.
2. Certificates
 - a. Provide certification that contractor/applicator utilized for application of intumescent fireproofing are approved by manufacturer.
 - b. Provide certification that specialized equipment as may be recommended by manufacturer for proper application of intumescent fireproofing shall be utilized for work of this section.
 - c. Provide certification that material has approval for use in New York City.
3. Manufacturer's Instructions: Submit manufacturer's installation procedures which shall be basis for accepting or rejecting action installation procedures.

1.7 QUALITY ASSURANCE

A. LEED BUILDING Performance Criteria:

The following criteria are REQUIRED for the products included in this section:

1. Materials in this section harvested and manufactured within 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements of this Section.
2. Adhesives or sealants used for work in this section shall meet the requirements of Section 018113.3 : Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING)", where applicable. As per Section 018113.3 , sealants used as filler shall not exceed 250 grams per liter.
3. Certification of these products shall be in accordance with the Submittal Requirements of this Section.

B. Qualifications

1. The contractor or subcontractor performing the work of this section must, within the last five (5) consecutive years prior to the bid opening, have successfully completed in a timely fashion at least three (3) projects similar in scope and type to the required work.
2. Single Source Responsibility
 - a. Intumescent fireproofing, decorative, protective, top coat shall be products from a single manufacturer or approved for use by the manufacturer.
 - b. Provide primers and other under coat materials which are produced or are specifically recommended by manufacturer of intumescent fireproofing to ensure compatibility of system.
3. Certification: Intumescent fireproofing materials shall bear classification marking by Warnock Hersey, ULI or other nationally recognized testing agency using ASTM standards and having a factory inspection service subject to approval of authority having jurisdiction. Products shall be manufactured under testing agency's follow-up program.
4. The manufacturer providing the material or equipment specified in this section must, for the past five (5) years, have been regularly engaged in the manufacture of material or equipment similar in type to that required for this Project. Such similar material or equipment provided by the manufacturer must have been in satisfactory service for not less than five (5) years.

1.8 DELIVERY, STORAGE, HANDLING

A. Packing, Shipping, Handling, and Unloading

1. Deliver products factory mixed, ready for application, in manufacturer's original unopened containers. Each container shall have manufacturer's label, intact and legible.

2. Include on the label for each container:
 - a. Manufacturer's name and address.
 - b. Type of coating.
 - c. Referenced Warnock Hersey, UL or nationally certified testing laboratory design number.
 - d. Warnock Hersey, UL or national certified testing laboratory seal.

B. Storage and Protection

1. Store materials in a clean, dry, protected area. Stack containers raised off ground, using blocking or skids to provide drainage.
2. Store materials at temperatures not less than 40 deg. F.
3. Protect material from freezing.
4. Discard materials which come in contact with contaminants, water, prior to actual use. Remove damaged materials from site.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Intumescent fireproofing shall not commence or proceed when steel surfaces are below 40 deg. F. or when ambient temperature is less than 40 deg. F. or expected within 24 hours.
- B. Relative humidity shall not exceed 80% throughout total period of application and drying of intumescent fireproofing, and shall not exceed 85% throughout application and drying period for protective decorative finish coat, unless approved by the manufacturer prior to application..
- C. Provide ventilation in areas to receive intumescent fireproofing during and for 24 hours following application to dry materials.

1.10 SEQUENCING AND SCHEDULING

- A. Schedule application of intumescent fireproofing with the Commissioner. The Contractor shall coordinate preparation and primer application with steel fabricators along with repairs and repriming of welds.
- B. Do not apply intumescent fireproofing until concrete toppings have been installed.
- C. Sequence work in conjunction with placement of hanger tabs, mechanical component hangers, electrical devices and any other similar devices connected to members scheduled to be coated.
- D. Steel surfaces with less than 36" clear working access may necessitate application of material to inaccessible surfaces prior to erection of finished steel members, either at point of fabrication or on-site.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Intumescent Fireproofing: Carboline Nullifire S605.
- B. Shop Primer: Section 051200 – Structural Steel.
- C. Protective Finish Coat: Carboline coating or approved equal.
- D. Products manufactured by Nu-Chem, Albi-Clad, and Cafco Inc. shall be considered for equivalent, if surface finish, texture, thickness and specified material characteristics comply with the conditions shown for this Project and manufacturer can provide above certifications.

2.2 MATERIALS

- A. Intumescent Fireproofing: Solvent, thin film fireproofing.
 - 1. Color: Manufacture's standard color to be maintained for the intumescent fireproofing material without colorants or additives that will affect UL rating.
 - 2. Ratings: 1.5 hours
 - 3. Properties
 - a. Surface Burning Characteristics: ASTM E 84.
 - 1). Flame Spread: Less than 15.
 - 2). Smoke Developed: Less than 65.
 - b. Hardness: (Shore D): D65
 - c. Impact: 67 in-pounds.
- B. Intumescent Filler Paste: As approved by manufacturer.
- C. Sealer/primer: Provide sealer/primer tinted differently from intumescent and appropriate base for finish top coat.
- D. Protective Finish Top Coat
 - 1. Custom color and finish. Provide top coat per UL test design.
 - 2. Finish Coat (Field Applied): Compatible with, and of the same manufacturer as, the primer and the intermediate coat. High build, aliphatic polyurethane, satin finish, one of the following:
 - a. "Carbothane 133HB" (Carboline Co.); 3.0 to 5.0 mils d.f.t.

2.3 EQUIPMENT

- A. Spray and roller equipment shall be as recommended by intumescent manufacturer.
- B. Dry film thickness gage.

- C. Air movement equipment.
- D. Dehumidification equipment.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine surfaces and conditions under which intumescent fireproofing is to be applied. Report any defects which may affect the work of this Section.
- B. Confirm compatibility of surfaces to receive fireproofing materials prior to application of fireproofing. Steel surfaces shall be primed with a compatible primer. The primer must be approved by the intumescent fireproofing manufacturer prior to shop priming to ensure sufficient adhesion. Coordinate work with ITEM 13 Section 051200 – Structural Steel to insure proper coordination.
- C. Applicator shall submit in writing certifications of substitute acceptance prior to proceeding with application of fireproofing.
- D. Correct conditions detrimental to timely and proper execution of work.
- E. Verify that all clips, hangers, sleeves and similar devices have been attached.
- F. Do not proceed until unsatisfactory conditions have been corrected. Beginning application indicates acceptance of substrate surfaces.

3.2 PREPARATION

- A. Clean substrate free of dust, dirt, grease or other foreign matter which would impair bond of fire resistance materials.

3.3 PROTECTION

- A. Protect adjacent surfaces and equipment from over spray of sprayed fireproofing materials.

3.4 APPLICATION

- A. Intumescent Fireproofing
 - 1. Prior to application, allow materials to reach same temperature as surface temperature of steel by storing unopened containers in areas where application is to take place.
 - 2. No spackle compound, gypsum basecoats, additives to intumescent paint fireproofing (other than reducers approved by the manufacturer) will be acceptable.
 - 3. Thoroughly mix intumescent fireproofing in accordance with manufacturer's instructions and apply in sufficient thickness to achieve the fire resistance rating. Apply in as many passes as necessary to cover, with uniformed texture.

4. Apply intumescent fireproofing in strict adherence with manufacturer's instructions by spray method. Brush or roller application shall be allowed only when spray application is not practical.
5. Spray apply material using heavy duty, self cleaning (reversible), type tip. Increase distance between tip and surface if necessary to adjust orange peel effect due to pressure. Adjust fan width accordingly.
6. Fireproofing material dries quickly, a viscosity increase may be experienced after container has been opened. Keep container covered as much as possible during application. use recirculation feature on spray equipment at all times, especially at breaks or interruptions during spraying.
7. When applying fireproofing with roller or brush, work from small containers, mixing frequently. Original pail shall be kept tightly closed and surface of material covered with plastic sheet provided for that purpose.
8. Fireproofing materials are designed for high build with minimum number of coats, however do not exceed 40 mils per dry coat as shrinkage may occur.
9. Follow manufacturer's recommendations for recoat times and timed to finish coat.
10. Final thickness shall be measured by dry film thickness gage. Do not apply protective top coat until it has been determined that required dry film thickness of intumescent fireproofing has been provided.
11. All runs, sags, orange peel in excess of 1/32" (peak to valley), depressions shall be sanded to achieve a uniform appearance in selected high finish areas.
12. Protect base coat from running water during curing process and finish coat.

B. Protective Finish Top Coat

1. Apply protective finish top coat in strict compliance with manufacturer's instructions by spray method.
2. Spray apply material using airless where contained and in selected high finish areas.
3. Apply protective finish top coat in compliance with wet and dry film thickness and spreading rates as recommended by manufacturer. Thickness of protective finish coat shall not exceed 4 mils dry per coat.
4. In the event of damage or other reason a portion of a member receiving the exterior intumescent cannot be painted at the time of the final coat the entire member shall be repainted. Patches are not acceptable.
5. Drying time between coats will vary with ambient temperature and humidity conditions. Successive coats shall not be applied until previous coat is dry to touch (approximately 16 hours at 77 deg. F. and 50% relative humidity).

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and to prepare test reports.
 - 1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.
- B. Testing and inspecting of completed applications of intumescent material will take place in successive stages, in areas of extent and using methods as follows. Do not proceed with application of fire-resistive material for the next area until test results for previously completed applications of fire-resistive material show compliance with requirements.
 - 1. The intumescent coating thickness shall be measured in accordance with Technical Manual 12-B, "Standard Practice of the Testing and Inspection of Field Applied Thin-Film Intumescent Fire Resistive Materials; an Annotated Guide" published by the Association of the Wall and Ceiling Industries.
 - 2. When testing discovers applications of fire-resistive material not in compliance with requirements, testing and inspecting agency will perform additional random testing to determine extent of noncompliance.
- C. Remove and replace applications of intumescent material where test results indicate that they do not comply with specified requirements.
- D. Apply additional fire-resistive material per manufacturer's written instructions where test results indicate that thickness does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 102113

FLOOR MOUNTED TOILET PARTITIONS

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SUMMARY

- A. Section Includes:
Work of this Section includes all labor, materials, equipment and services necessary to complete the floor mounted toilet partitions as shown on the drawings and/or specified herein.
 - 1. Stainless-steel toilet compartments configured as toilet enclosures and urinal screens.
- B. Related Sections:
 - 1. Construction Waste Management And Disposal - Section 017419
 - 2. Sustainable Design Requirements (Leed Building) - Section 018113
 - 3. Volatile Organic Compound (Voc) Limits For Adhesives, Sealants, Paints And Coatings - Section 018113.3
 - 4. Construction IAQ Requirements – Section 018119
 - 5. Rough Carpentry – Section 061000
 - 6. Gypsum Drywall - Section 092500.
 - 7. Stone and Tile - Section 093100.
 - 8. Toilet accessories - Section 102800.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. LEED Submittals:

1. Product Data for Credit IEQ 4.4: For particleboard, documentation indicating that product contains no urea formaldehyde.
 2. Laboratory Test Reports for Credit IEQ 4: For adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachments to other work.
1. Show locations of cutouts for compartment-mounted toilet accessories.
 2. Show locations of reinforcements for compartment-mounted grab bars.
 3. Show locations of centerlines of toilet fixtures.
 4. Show ceiling grid and overhead support or bracing locations.
- D. Samples for Initial Selection: For each type of unit indicated. Include Samples of hardware and accessories involving material and color selection.
- E. LEED BUILDING Submittal Requirements:
The contractor or subcontractor shall submit the following LEED BUILDING certification items:
1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications.
 2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
 3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION
 4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
- The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the LEED Consultant for review.
- F. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:
1. Each type of material, color, and finish required for units, prepared on 6-inch- square Samples of same thickness and material indicated for Work.
 2. Each type of hardware and accessory.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of toilet compartment, from manufacturer.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Comply with requirements in GSA's CID-A-A-60003, "Partitions, Toilets, Complete."
- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84, or another standard acceptable to authorities having jurisdiction, 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.
- C. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" for toilet compartments designated as accessible.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M.
- B. Aluminum Extrusions: ASTM B 221.
- C. Brass Castings: ASTM B 584.
- D. Brass Extrusions: ASTM B 455.
- E. Steel Sheet: Commercial steel sheet for exposed applications; mill phosphatized and selected for smoothness.
- F. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.

- G. Stainless-Steel Castings: ASTM A 743/A 743M.
- H. Particleboard: ANSI A208.1, Grade M-2 with 45-lb density, made with binder containing no urea formaldehyde.
- I. Adhesives: Manufacturer's standard product that complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 STAINLESS-STEEL UNITS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product by one of the following:
 - 1. Accurate Partitions Corporation.
 - 2. All American Metal Corp.
 - 3. American Sanitary Partition Corporation.
 - 4. Ampco, Inc.
 - 5. Bradley Corporation; Mills Partitions.
 - 6. Flush Metal Partition Corp.
 - 7. General Partitions Mfg. Corp.
 - 8. Global Steel Products Corp.
 - 9. Hadrian Manufacturing Inc.
 - 10. Knickerbocker Partition Corporation.
 - 11. Metpar Corp.
 - 12. Rockville Partitions Incorporated.
 - 13. Sanymetal; a Crane Plumbing company.
 - 14. Shanahan's Limited.
 - 15. Weis-Robart Partitions, Inc.
- C. Toilet-Enclosure Style: Floor anchored.
- D. Door, Panel, and Pilaster Construction: Seamless, metal facing sheets pressure laminated to core material; with continuous, interlocking molding strip or lapped-and-formed edge closures; corners secured by welding or clips and exposed welds ground smooth. Exposed surfaces shall be free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections.
 - 1. Core Material: Manufacturer's standard sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of 1 inch for doors and panels and 1-1/4 inches for pilasters.
 - 2. Grab-Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on units.
 - 3. Tapping Reinforcement: Provide concealed reinforcement for tapping (threading) at locations where machine screws are used for attaching items to units.

- E. Facing Sheets and Closures: Stainless-steel sheet of nominal thicknesses as follows:
1. Pilasters, Braced at Both Ends: Manufacturer's standard thickness, but not less than 0.038 inch.
 2. Pilasters, Unbraced at One End: Manufacturer's standard thickness, but not less than 0.050 inch.
 3. Panels: Manufacturer's standard thickness, but not less than 0.031 inch.
 4. Doors: Manufacturer's standard thickness, but not less than 0.031 inch.
 5. Flat-Panel Urinal Screens: Thickness matching the panels.
 6. Integral-Flange, Wall-Hung Urinal Screens: Manufacturer's standard thickness, but not less than 0.031 inch.
 7. Wedge-Shaped, Wall-Hung Urinal Screens: Manufacturer's standard thickness, but not less than 0.038 inch.
- F. Pilaster Shoes and Sleeves (Caps): Stainless-steel sheet, not less than 0.031-inch nominal thickness and 3 inches high, finished to match hardware.
- G. Brackets (Fittings):
- H. Stainless-Steel Finish: No. 4 satin finish on exposed faces. Protect exposed surfaces from damage by application of strippable, temporary protective covering before shipment.

2.3 ACCESSORIES

- A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.
1. Material: Stainless steel.
 2. Hinges: Manufacturer's standard Gravity hinge type, self-closing, concealed within door, fully adjustable, to bring door to rest in thirty (30) degree open position. Hinge brackets solid forged brass or stainless steel, with solid stainless steel pin and pintels.
 3. Latch and Keeper: Manufacturer's standard recessed latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
 4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
 5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
 6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
- B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.
- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match the 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.

2.4 FABRICATION

- A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- B. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.
- C. Door Size and Swings: Unless otherwise indicated, provide 26-inch- wide, in-swinging doors for standard toilet compartments.

PART 3 - EXECUTION

3.1 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: 1/2 inch.
 - b. Panels and Walls: 1 inch.
 - 2. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than two brackets attached near top and bottom of panel.
 - a. Locate wall brackets 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. Floor-Anchored Units: Set pilasters with anchors penetrating not less than 2 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.
- D. Ceiling-Hung Units: Secure pilasters to supporting structure and level, plumb, and tighten. Hang doors and adjust so bottoms of doors are level with bottoms of pilasters when doors are in closed position.

- E. Floor-and-Ceiling-Anchored Units: Secure pilasters to supporting construction and level, plumb, and tighten. Hang doors and adjust so doors are level and aligned with panels when doors are in closed position.
- F. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.2 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 102113

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 102800

TOILET AND UTILITY ACCESSORIES

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SECTION INCLUDES

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete the toilet accessories as shown on the drawings and/or specified herein.

1.3 RELATED SECTIONS

- A. Construction Waste Management And Disposal - Section 017419
- B. Sustainable Design Requirements (LEED Building) - Section 018113
- C. Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints And Coatings - Section 018113.3
- D. Construction IAQ Requirements – Section 018119
- E. Masonry - Section 042000.
- F. Rough Carpentry – Section 061000
- G. Miscellaneous Metals – Section 055000
- H. Gypsum Drywall - Section 092500.
- I. Stone and Tile - Section 093100.

J. Floor Mounted Toilet Partitions- Section 102113

J. Coordination with Work in Divisions 21-23, 26-28.

1.4 QUALITY ASSURANCE

- A. Inserts and Anchorages: Furnish inserts and anchoring devices which must be set in concrete or built into masonry; coordinate delivery with other work to avoid delay.
- B. Accessory Locations: Coordinate accessory locations with other work to avoid interference and to assure proper operation and servicing of accessory units. Height of accessories shall be installed in compliance with prevailing Handicap Code.
- C. Products: Unless otherwise noted, provide products of same manufacturer for each type of unit and for units exposed in same areas.

1.5 SUBMITTALS

- A. LEED BUILDING Submittal Requirements:
The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 - 1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications.
 - 2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
 - 3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION
 - 4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
 - 5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the LEED Consultant for review.
- B. Product Data: Submit manufacturer's technical data, catalogue cuts and installation instructions for each toilet accessory.

C. Setting Drawings: Provide setting drawings, templates, instructions, and directions for installation of anchorage devices in other work

D. Submit schedule of accessories indicating quantity and location of each item.

1.6 PRODUCT HANDLING

A. Deliver accessories to the site ready for use in the manufacturer's original and unopened containers and packaging, bearing labels as to type or material, manufacturer's name and brand name. Delivered materials shall be identical to approved samples.

PART 2 PRODUCTS

2.1 MATERIALS

A. Stainless Steel: AISI Type 302/304, with polished No. 4 finish, 22 gauge minimum, unless otherwise indicated.

B. Brass: ASTM B 19 flat products; ASTM B 16, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.

C. Galvanized Steel Sheet: ASTM A653, G60.

D. Chromium Plating: Nickel and chromium electro-deposited on base metal, ASTM B456, Type SC 2.

E. Mirrors: ASTM C1503, mirror glazing quality, clear glass mirrors, nominal 1/4" thick.

2.2 FASTENING DEVICES

A. Exposed Fasteners: Theftproof type, chrome plated, or stainless steel; match finishes on which they are being used.

B. Concealed Fasteners: Galvanized (ASTM A123) or cadmium plated.

C. No exposed fastening devices permitted on exposed frames.

D. For metal stud drywall partitions, provide ten (10) gauge galvanized sheet concealed anchor plates for securing surface mounted accessories.

2.3 FABRICATION

A. General: Stamped names or labels on exposed faces of toilet accessory units are not permitted. Unobtrusive labels on surfaces not exposed to view are acceptable. Where locks are required for a particular type of toilet accessory, provide same keying throughout project. Furnish two keys for each lock.

B. Surface-Mounted Toilet Accessories, General: Fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless steel piano hinge. Provide concealed anchorage.

- C. Recessed Toilet Accessories, General: Fabricate units of all welded construction, without mitered corners. Hang doors of access panels with full-length stainless steel piano hinge. Provide anchorage which is fully concealed when unit is closed.

2.4 MANUFACTURERS

A. Provide products manufactured by

1. Bobrick Washroom Equipment Co.
2. Bradley Corp
3. American Specialties, Inc.
4. Duraware
5. Global
6. Koala Kare
7. or approved equal

2.5 ACCESSORY SCHEDULE

1. Basis of Design

- | | |
|----------------------------|------------------------|
| a. Toilet Tissue Dispenser | Bobrick B2888 |
| b. Mirror | DuraWare 1813 |
| c. Soap Dispenser | Bobrick B-306 |
| d. Baby Changing Station | Koala Kare KB-110-SSER |
| e. Grab-Bars | Bobrick B-5806 |
| f. Paper Towel Dispenser | Bobrick B35903 |

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where toilet accessories are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 PREPARATION

- A. Accessories which are to be partition mounted shall be closely coordinated with other trades, so that the necessary reinforcing is provided to receive the accessories.
- B. Furnish templates and setting drawings and anchor plates required for the proper installation of the accessories at gypsum drywall and masonry partitions. Coordinate the work to assure that base plates and anchoring frames are in the proper position to secure the accessories.

- C. Verify by measurements taken at the job site those dimensions affecting the work. Bring field dimensions which are at variance with those on the approved shop drawings to the attention of the Commissioner. Obtain decision regarding corrective measures before the start of fabrication of items affected.
- D. Cooperate in the coordination and scheduling of the work of this Section with the work of other Sections so as not to delay job progress.

3.3 INSTALLATION

- A. Install accessories at locations indicated on the drawings, using skilled mechanics, in a plumb, level and secure manner.
- B. Concealed anchor assemblies for gypsum drywall partitions shall be securely anchored to metal studs to accommodate accessories. Assemblies shall consist of plates and/or angles tack welded to studs.
- C. Secure accessories in place, at their designated locations by means of theftproof concealed set screws, so as to render removing of the accessory with a screwdriver impossible.
- D. Unless otherwise indicated, accessories shall conform to heights from the finished floor as shown on the drawings. Where locations are not indicated, such locations shall be as directed by the Commissioner.
- E. Installed accessories shall operate quietly and smoothly for use intended. Doors and operating hardware shall function without binding or unnecessary friction. Dispenser type accessories shall be keyed alike. Prior to final acceptance, master key and one duplicate key shall be given to The City of New York's authorized agent.
- F. The Commissioner shall be the sole judge of workmanship. Workmanship shall be of the highest quality. Open joints, weld marks, poor connections, etc., will not be permitted. The Commissioner has the right to reject any accessory if he feels the workmanship is below the standards of this project.
- G. Grab bars shall be installed so that they can support a three hundred (300) lb. load for five minutes per ASTM F446.

3.4 CLEANING AND PROTECTION

- A. Upon completion of the installation, clean accessories of dirt, paint and foreign matter.
- B. During the installation of accessories and until finally installed and accepted, protect accessories with gummed canvas or other means in order to maintain the accessories in acceptable condition.
- C. Replace and/or repair installed work which is damaged or defective to The City of New York's satisfaction, at no additional cost.

END OF SECTION

SECTION 104000

SIGNAGE

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SECTION INCLUDES

- A. The Work of this Section includes all labor, materials, equipment and services necessary to complete the identifying devices as shown on the drawings and/or specified herein.
- B. Signage for rooms, stairs and other areas as indicated in the signage schedule included in the drawings.
- C. Production and installation of signage in locations as indicated

1.3 RELATED SECTIONS

- A. Construction Waste Management And Disposal – Section 017419
- B. Sustainable Design Requirements (Leed Building) – Section 018113
- C. Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints And Coatings – Section 018113.3
- D. Construction IAQ Requirements – Section 018119
- E. Unit Masonry- Section 042000

- F. Miscellaneous Metals- 055000
- G. Hollow Metal Doors – Section 088113
- H. Overhead Coiling Grilles- Section 083322
- I. Aluminum Framed Entrances and Storefront- Section 084113
- J. Gypsum Drywall – Section 092500
- K. Painting and Finishing – Section 099000
- L. Exit signs - Divisions 26-28.

1.4 QUALITY ASSURANCE

- A. For actual installation of the identifying devices, use only personnel who are thoroughly familiar with the manufacturer's recommended methods of installation and who are completely trained in the required skills.

1.5 SUBMITTALS

A. LEED BUILDING Submittal Requirements:

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications.
2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION
4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the LEED Consultant for review.

- A. Product Data: Submit manufacturer's technical data and installation instructions for each type of identifying device required.
 - B. Samples: Submit samples of each identifying device showing finishes, colors, surface textures and qualities of manufacture and design of each sign component including graphics.
 - C. Shop Drawings: Submit shop drawings for fabrication and erection of identifying devices. Include plans, elevations, and large-scale details of sign wording and lettering layout. Show anchorage and accessory items. Furnish location template drawings for items supported or anchored to permanent construction.
- 1.6 PRODUCT HANDLING
- A. Protection: Use all means necessary to protect the materials of this Section before, during and after installation and to protect the installed work and materials of all other trades.
 - B. Replacements: In the event of damage, immediately make all repairs and replacements necessary.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Provide all signage required by Code.
- B. Subject to compliance with requirements of the Contract Documents, provide signage as manufactured by one of the following or approved equal.
 - 1. Designer Sign Systems
 - 2. APCO Graphics, Inc.
 - 3. ASI Sign Systems, Inc.
 - 4. The Supersine Co.
- C. New and Refurbished Exterior Signage
 - 1. Existing painted steel and stainless steel exterior sign, 28'3" x 2'4", vif.
 - 2. New exterior sign: 16 gauge painted steel sign w/ 1/4" 316 stainless steel letters, 30' 5" vif x 1'8".
- D. ADA Plaque Signs

1. Construction: Signs shall be 1/8" thick black, white or clear painted acrylic with 0.015 matte polycarbonate film with embossed copy adhered to the acrylic using continuous 0.015 double-sided polystyrene film adhesive. Corners shall be square.
 - a. Note: Glued-on letters or photopolymer plaques are not acceptable ADA construction.
2. Finish: Non-gloss finish of 11 to 19 degrees on a 60 degree glossometer. Surface shall be eggshell matte in appearance.
3. Graphics: Letters shall be 1/32" raised with integral color. Letters shall be sub-surface and encapsulated by the polycarbonate face, or molded with integral pre-colored plastic with heat-stamped raised graphics where required. Braille shall be Grade II, 0.019" high domed dots. Signs shall meet ADA Code and ASI 117.1
4. Background Color: Background Color shall be subsurface. Color shall provide a 70 percent contrast between type and background color.
5. Copy Color: Black or white, as selected by the Commissioner.
6. Mounting: Mount plaque sign with 3M, 1/32" double-sided vinyl or foam type and silastic adhesive as required by wall surface.
7. Sizes:
 - a. 15" x 24" for Occupancy Signs
 - b. 11" x 8" for Stair Tower Signs.
 - c. 6" x 6" for Elevator and Mechanical Room Signs.
 - d. 6" x 6" for Fire Emergency Signs
 - e. 8" x 6" for Toilet Room Signs

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where identifying devices is to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Install units and components at the locations directed by the Commissioner, securely mounted with concealed theft-resistant fasteners. Attach to substrates in accordance with the manufacturer's instructions.

- B. Install level, plumb, and at the proper height. Cooperate with other trades for installation of sign units to finish surfaces. Repair or replace damaged units as directed by the Commissioner.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 104416

FIRE EXTINGUISHERS AND CABINETS

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SECTION INCLUDES

- A. The Work of this Section includes all labor, materials, equipment and services necessary to complete the fire extinguishers and cabinets as shown on the drawings and/or specified herein.

1.3 RELATED SECTIONS

- A. Construction Waste Management and Disposal - Section 017419
- B. Sustainable Design Requirements (LEED Building) – Section 018113
- C. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3
- D. Construction IAQ Requirements - Section 018119
- E. Masonry Restoration and Cleaning – Section 049000
- F. Structural steel - Section 051200.
- G. Carpentry – Section 062000
- H. Architectural Woodwork – Section 064000
- I. Glass and Glazing – Section 088000
- J. Gypsum Drywall – Section 092500

J. Painting and Finishing- Section 099100.

L. Related work in Divisions 21-23 and 26-28

1.4 QUALITY ASSURANCE

A. LEED BUILDING - GENERAL REQUIREMENTS:

The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

B. Provide portable fire extinguishers, cabinets and accessories by one manufacturer.

C. UL-Listed Products: Provide new portable fire extinguishers which are UL-listed and bear UL "Listing Mark" for type, rating, and classification of extinguisher indicated.

1.5 SUBMITTALS

A. LEED BUILDING SUBMITTAL REQUIREMENTS

A. LEED BUILDING Submittal Requirements:

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 Sustainable Design Requirements (LEED Building) of these specifications.
2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the LEED Consultant for review.

- B. Product Data: Submit manufacturer's technical data and installation instructions for all portable fire extinguishers required. For fire extinguisher cabinets include roughing-in dimensions, and details showing mounting methods, relationships to surrounding construction, door hardware, cabinet type and materials, trim style and door construction, style and materials. Where color selections by Commissioner are required, include color charts showing full range of manufacturer's standard colors and designs available.
- C. Samples: Submit samples, 6" square, of each required finish. Prepare samples on metal of same gauge as metal to be used in the work. Where normal color variations are to be expected, include 2 or more units in each sample showing the limits of such variations.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide products of one of the following:
 - 1. Amerex Corporation, Monroe Extinguisher Company, Inc, Larsen's Mfg. Co., or approved equal

2.2 EXTINGUISHERS

- A. General: Provide fire extinguishers for each extinguisher cabinet and other locations indicated, in colors and finishes selected by Commissioner from manufacturer's standard which comply with requirements of governing authorities.
 - 1. Types: A, A/B, A/C and K as indicated on floor plans.
- B. Abbreviations indicated below to identify extinguisher type related to UL classification and rating system and not necessarily to type and amount of extinguishing material contained in extinguisher.
- C. Multi-Purpose Dry Chemical Type: UL rated 2A-10B:C, 5 lb. nominal capacity, in enameled steel container, for Class A, Class B and Class C fires.

2.3 MOUNTING BRACKETS

- A. Provide manufacturer's standard bracket designed to prevent accidental dislodgment of extinguisher, of proper size for type and capacity of extinguisher specified, in manufacturer's standard enamel finish; color to match extinguisher.

2.4 CABINETS

- A. Type and Style: Fire extinguisher cabinets shall be metal with solid stainless steel doors.

- B. Color: Fire extinguisher cabinets shall be factory pre-finished stainless steel satin finish.
- C. Design is based on "Model 3012-SM" of Larsen's Mfg. Co. Other manufacturers noted herein may substitute their equivalent cabinet upon acceptance by the Commissioner.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where fire extinguishers and cabinets are to be installed and correct any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.

3.2 INSTALLATION

- A. Install items included in this Section in locations indicated and at heights to comply with applicable regulations of governing authorities.
 - 1. Prepare recesses in walls for fire extinguisher cabinets as required by type and size of cabinet and style of trim and to comply with manufacturer's instructions.
 - 2. Securely fasten mounting brackets and fire extinguisher cabinets to structure, square and plumb, to comply with manufacturer's instructions.
- B. Where exact location of cabinets and bracket-mounted fire extinguishers is not indicated, locate as directed by the Commissioner.

3.3 IDENTIFICATION

- A. Identify fire extinguisher in cabinet with lettering spelling "FIRE EXTINGUISHER" die cut. Provide lettering on door as selected by Commissioner from manufacturer's standard letter sizes, styles, colors and layouts.
- B. Identify bracket-mounted extinguishers with red letter decals spelling 'FIRE EXTINGUISHER' applied to wall surface. Letter size, style and location as selected by the Commissioner.

3.4 SERVICE

- A. Determine the approximate completion date of the work and then inspect, charge, and tag the fire extinguishers at a date not more than 10 days before or not less than one day before actual completion date of the work.

END OF SECTION

Bronx River Art Center
Bronx, NY

Fire Extinguishers and Cabinets
104416-4 of 4

SECTION 123200

MANUFACTURED WOOD CASEWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.

B. LEED BUILDING - GENERAL REQUIREMENTS:

The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SUMMARY

A. Section Includes:

1. Base cabinets for utility sinks
2. Plastic-laminate-faced wood cabinets of stock design.
3. Stainless Steel Countertops

B. Related Sections:

1. Construction Waste Management and Disposal - Section 017419
2. Sustainable Design Requirements (LEED Building) - Section 018113 |
3. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3
4. Construction IAQ Requirements - Section 018119
5. Miscellaneous Metals Section 055000
6. Rough Carpentry Section 061000
7. Resilient Tile Flooring Section 096519
8. Painting and Finishing Section 099000

1.3 DEFINITIONS

A. MDF: Medium-density fiberboard.

- B. Exposed Portions of Cabinets: Surfaces visible when doors and drawers are closed, including bottoms of cabinets more than 48 inches above floor, and surfaces visible in open cabinets.
- C. Semi-exposed Portions of Cabinets: Surfaces behind opaque doors, such as interiors of cabinets, shelves, dividers, interiors and sides of drawers, and interior faces of doors. Tops of cases 78 inches or more above floor are defined as semiexposed.
- D. Concealed Portions of Cabinets: Surfaces not usually visible after installation, including sleepers, web frames, dust panels, and ends and backs that are placed directly against walls or other cabinets.
- E. Hardwood Plywood: A panel product composed of layers or plies of veneer, or of veneers in combination with lumber core, hardboard core, MDF core, or particleboard core, joined with adhesive, and faced both front and back with hardwood veneers.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED BUILDING Submittal Requirements:
The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 - 1. A completed ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Sustainable Design Requirements (LEED Building) - Section 018113 of these specifications. Information to be supplied includes:
 - a. The amount of recycled content in the wood product(s). Identify post-consumer and/or post-industrial recycled content.
 - b. Location in which wood materials were manufactured or fabricated and location from which wood was harvested.
 - c. For wood products, indication (Y/N) of whether the supplied product(s) are certified by the Forest Stewardship Council (FSC).
 - c. Provide material costs for the materials included in the contractor's or subcontractor's work. Material cost does not include costs associated with labor and equipment. Include total cost for all wood products and itemized costs for all FSC-certified wood products.
 - 2. Letters of Certification, provided from the product manufacturer on the manufacturer's letterhead, to verify the amount of recycled content.
 - 3. Product Cut Sheets for all materials that meet the LEED BUILDING Performance criteria, as per the QUALITY ASSURANCE requirements of this Section. Cut sheets shall be submitted with the Contractor or Subcontractor's stamp, as confirmation that the submitted

products are the products installed in the project.

4. Material Safety Data Sheets (MSDS), for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings applied on the interior of the building. MSDS shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
 5. Documentation that all composite wood and agrifiber products do not contain added urea-formaldehyde resins.
 6. Chain of custody certificate to document FSC-certification if applicable.
- C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Show fabrication details, including types and locations of hardware. Show installation details, including field joints and filler panels. Indicate manufacturer's catalog numbers for casework.
- D. Samples for Initial Selection: For cabinet finishes and for each type of top material indicated.
- E. Samples for Verification: 8-by-10-inch Samples for each type of finish.
1. One full-size finished base cabinet complete with hardware, doors, and drawers, but without countertop.
 2. One full-size finished wall cabinet complete with hardware, doors, and adjustable shelves.
 3. Maintain full-size Samples at Project site during construction in an undisturbed condition as a standard for judging the completed Work. Unless otherwise indicated, approved sample units may become part of the completed Work if in undisturbed condition at time of Substantial Completion. Notify Commissioner of their exact locations.

1.5 QUALITY ASSURANCE

A. LEED BUILDING Performance Criteria:

The following criteria are REQUIRED for the products included in this section:

1. Engineered wood, not including salvaged wood, shall contain a minimum of 10% (combined) post-industrial/post-consumer recycled content (the percentage of recycled content is based on the weight of the component materials). Certification of recycled content shall be in accordance with the Submittal Requirements of this Section.
2. All composite wood, engineered wood, or agrifiber products (e.g., plywood, particleboard, medium density fiberboard) shall contain no added urea-formaldehyde resins. Acceptable resins and binders include, but are not limited to, phenol formaldehyde and methyl diisocyanate (MDI). Certification of these products shall be in accordance with the Submittal Requirements of this Section.
3. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.

4. Wood Materials harvested and manufactured within 500 miles (by air) of the project site shall be documented in accordance with the Submittal Requirements of this Section.
5. Permanently Installed wood-based materials used in this project that have been certified in accordance with the Forest Stewardship Council (FSC) guidelines shall be documented in accordance with the Submittal Requirements of this Section.
 - a. Applicable products include, but are not limited to, structural framing and general dimensional framing, flooring, finishes, built-in furnishings, miscellaneous blocking, fire rated plywood back panels used for equipment mounting, architectural panels, and plywood.
 - b. Certified wood material suppliers may be researched through the following web-sites: www.rainforest-alliance.org/greenbuilding, www.smartwood.org, <http://www.certifiedwoodsearch.org/searchproducts.aspx>, http://www.fscus.org/certified_companies/.
 - c. Wood products previously purchased and used on prior projects, which are reused on this Project, are exempt from the FSC certification requirement. Appropriate documentation certifying reused wood products must be submitted.
6. Adhesives or sealants used for work in this section shall meet the requirements of Section 018113.3 : Volatile Organic Compound (VOC) Limits For Adhesives, Sealants, Paints and Coatings (LEED BUILDING), where applicable.
7. The calculation of VOC shall exclude water and tinting color added at the point of sale
8. Certification of these products shall be in accordance with the LEED BUILDING Submittal Requirements of this Section.
- B. Quality Standard: Unless otherwise indicated, comply with requirements for modular cabinets in AWI's "Architectural Woodwork Quality Standards."
 1. Provide AWI Quality Certification Program labels indicating that manufactured wood casework complies with requirements.
- C. Quality Standard: Unless otherwise indicated, comply with WI's "Manual of Millwork" for Economy grade.
 1. Provide WI-certified compliance certificate indicating that manufactured wood casework complies with requirements of grades specified.
 2. Product Designations: Drawings indicate manufactured wood casework configurations by referencing WI design series numbering system as defined in WI's "Manual of Millwork."
- D. Product Designations: Drawings indicate sizes, configurations, and finish material of manufactured wood casework by referencing designated manufacturer's catalog numbers. Other manufacturers' casework of similar sizes and door and drawer configurations, of same finish material, and complying with the Specifications may be considered. Refer to Division 01 Section "Product Requirements."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver manufactured wood casework only after painting, utility roughing-in, and similar operations that could damage, soil, or deteriorate casework have been completed in installation areas. If casework must be stored in other than installation areas, store only in areas where environmental conditions meet requirements specified in "Project Conditions" Article.
- B. Keep finished surfaces covered with polyethylene film or other protective covering during handling and installation.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install manufactured wood casework until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Verify actual dimensions of construction contiguous with manufactured wood casework by field measurements before fabrication.

1.8 COORDINATION

- A. Coordinate layout and installation of framing and reinforcements in walls and partitions for support of manufactured wood casework.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of manufactured wood casework that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Delamination of components or other failures of glue bond.
 - b. Warping of components.
 - c. Failure of operating hardware.
 - d. Deterioration of finishes.
 - 2. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Ikea "Akurum/Harlig upper and base cabinets or comparable product by one of the following:
 - 1. Plastic-Laminate-Faced Manufactured Casework:
 - a. Armstrong Cabinets, Masterbrand Cabinets, Inc.
 - b. Case Systems Inc.
 - c. Or approved equal

2.2 MATERIALS, GENERAL

- A. Maximum Moisture Content for Lumber: 7 percent for hardwood and 12 percent for softwood.
- B. Hardwood Plywood: HPVA HP-1, either veneer core or particleboard core unless otherwise indicated.
- C. Softwood Plywood: DOC PS 1.
- D. Particleboard: ANSI A208.1, Grade M-2.
- E. Particleboard: Straw-based particleboard complying with ANSI A208.1, Grade M-2, except for density.
- F. MDF: ANSI A208.2, Grade 130.
- G. Hardboard: AHA A135.4, Class 1 Tempered.
- H. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Abet Inc.
 - b. Nevamar Company, LLC; Decorative Products Div.
 - c. Wilsonart International; Div. of Premark International, Inc.
- I. Thermoset Decorative Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.
- J. Edgebanding for Plastic Laminate: Plastic laminate matching adjacent surface.

- K. Edgebanding for Thermoset Decorative Panels: PVC or polyester edge banding complying with LMA EDG-1 and matching thermoset decorative panels.
- L. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, suitable for exposed applications.
- M. Stainless-Steel Sheet: ASTM A 240 or ASTM A 666, Type 304, with No. 4 satin finish.

2.3 CABINET MATERIALS

- A. Exposed Cabinet Materials:
 - 1. Plastic Laminate: Grade VGS.
 - 2. Unless otherwise indicated, provide specified edgebanding on all exposed edges.
 - 3. Plastic Laminate: Grade VGS.
 - a. Provide plastic laminate for semiexposed surfaces unless otherwise indicated.
 - b. Provide plastic laminate for interior faces of doors and drawer fronts and where indicated.
 - 4. Thermoset Decorative Panels: Provide thermoset decorative panels for semiexposed surfaces unless otherwise indicated.
 - 5. Metal for Steel Drawer Pans: Cold-rolled, steel sheet.
 - 6. Unless otherwise indicated, provide specified edgebanding on all semiexposed edges.
- B. Concealed Cabinet Materials:
 - 1. Plastic Laminate: Grade BKL.

2.4 DESIGN, COLOR, AND FINISH

- A. Thermoset Decorative Panel Colors, Patterns, and Finishes: glossy white.
- B. Plastic-Laminate Colors, Patterns, and Finishes: glossy white.

2.5 CABINET FABRICATION

- A. Plastic-Laminate-Faced Cabinet Construction: As required by referenced quality standard, but not less than the following:
 - 1. Bottoms and Ends of Cabinets, and Tops of Wall Cabinets and Tall Cabinets: 3/4-inch particleboard, plastic-laminate faced on exposed surfaces, thermoset decorative panels on semiexposed surfaces.
 - 2. Shelves: 3/4-inch plywood, plastic-laminate faced.
 - 3. Backs of Cabinets: 1/2-inch particleboard, plastic-laminate faced on exposed surfaces, thermoset decorative panels on semiexposed surfaces.
 - 4. Drawer Fronts: 3/4-inch particleboard, plastic-laminate faced.
 - 5. Drawer Sides and Backs: 1/2-inch solid-wood or veneer-core hardwood plywood, with glued dovetail or multiple-dowel joints.

6. Drawer Bottoms: 1/4-inch hardwood plywood glued and dadoed into front, back, and sides of drawers. Use 1/2-inch material for drawers more than 24 inches wide.
 7. Doors: 3/4-inch particleboard or MDF, plastic-laminate faced.
- B. Leg Shoes: Vinyl or rubber, black, open-bottom type.
- C. Filler Strips: Provide as needed to close spaces between cabinets and walls, ceilings, and indicated equipment. Fabricate from same material and with same finish as cabinets.

2.6 CASEWORK HARDWARE AND ACCESSORIES

- A. Hardware, General: Unless otherwise indicated, provide manufacturer's standard satin-finish, commercial-quality, heavy-duty hardware.
1. Use threaded metal or plastic inserts with machine screws for fastening to particleboard except where hardware is through-bolted from back side.
- B. Butt Hinges: Stainless-steel, semiconcealed, 5-knuckle hinges complying with BHMA A156.9, Grade 1, with antifriction bearings and rounded tips. Provide 2 hinges for doors less than 48 inches high and 3 hinges for doors more than 48 inches high.
- C. Frameless Concealed Hinges (European Type): BHMA A156.9, Type B01602, 170 degrees of opening.
- D. Pulls: Solid stainless-steel wire pulls, fastened from back with two screws. Provide 2 pulls for drawers more than 24 inches wide.
- E. Door Catches: Powder-coated,. Provide 2 catches on doors more than 48 inches high.
- F. Drawer Slides: BHMA A156.9, Type B05091.
1. Standard Duty (Grades 1, 2, and 3): Side mounted and extending under bottom edge of drawer; full-extension type; zinc-plated steel with polymer rollers.
 2. Box Drawer Slides: Grade 1, for drawers not more than 6 inches high and 24 inches wide.
- G. Drawer and Hinged Door Locks: Cylindrical (cam) type, 5-pin tumbler, brass with chrome-plated finish, and complying with BHMA A156.11, Grade 1.
1. Provide a minimum of two keys per lock and six master keys.
 2. Provide locks on all doors and drawers.

2.7 COUNTERTOPS

- A. Countertops, General: Provide smooth, clean exposed tops and edges in uniform plane free of defects. Provide front and end overhang of 1 inch over base cabinets.

- B. Stainless-Steel Tops: Made from 0.0625-inch- thick, stainless-steel sheet.
1. Weld shop-made joints, and grind and polish surfaces to produce uniform, directional, textured, polished finish indicated, free of cross scratches. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 2. Sound deaden undersurface with heavy-build mastic coating.
 3. Extend top down to provide a 1-inch- thick edge with a 1/2-inch return flange.
 4. Form backsplash coved to and integral with top surface, with a 1/2-inch- thick edge and 1/2-inch return flange.
 5. Provide raised marine edge around perimeter of tops containing sinks; pitch two ways to sink to provide drainage without channeling or grooving.
 6. Where stainless-steel sinks occur in stainless-steel tops, factory weld into one integral unit, grind welds smooth, and polish, passivate, and rinse.
 7. Fabricate stainless-steel sinks with corners rounded and coved to at least a 5/8-inch radius. Slope sink bottoms to outlet. Provide double-wall construction for sink partitions with top edge rounded to at least a 1/2-inch diameter.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of framing and reinforcements, and other conditions affecting performance of manufactured wood casework.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 CASEWORK INSTALLATION

- A. Install level, plumb, and true; shim as required, using concealed shims. Where manufactured wood casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.
- B. Base Cabinets: Set cabinets straight, level, and plumb. Adjust subtops within 1/16 inch of a single plane. Fasten cabinets to masonry or framing, wood blocking, or reinforcements in walls and partitions with fasteners spaced 24 inches o.c. Bolt adjacent cabinets together with joints flush, tight, and uniform. Align similar adjoining doors and drawers to a tolerance of 1/16 inch.
1. Where base cabinets are not installed adjacent to walls, fasten to floor at toe space with fasteners spaced 16 inches o.c. Secure sides of cabinets to floor, where they do not adjoin other cabinets, with not less than two fasteners.
- C. Wall Cabinets: Hang cabinets straight, level, and plumb. Adjust fronts and bottoms within 1/16 inch of a single plane. Fasten to hanging strips, masonry, or framing, blocking, or reinforcements in walls or partitions. Align similar adjoining doors to a tolerance of 1/16 inch.

1. Fasten through back, near top and bottom, at ends, and not more than 16 inches o.c.
 2. Use toggle bolts at hollow masonry.
 3. Use expansion anchors at solid masonry.
 4. Use No. 10 wafer-head screws sized for 1-inch penetration at wood hanging strips.
 5. Use No. 10 wafer-head screws sized for 1-inch penetration into wood framing or blocking at wood-framed partitions.
 6. Use No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish at metal-framed partitions.
 7. Use toggle bolts at plaster on metal lath.
- D. Install hardware uniformly and precisely. Set hinges snug and flat in mortises unless otherwise indicated. Adjust and align hardware so moving parts operate freely and contact points meet accurately. Allow for final adjustment after installation.
- E. Adjust casework and hardware so doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

3.3 INSTALLATION OF TOPS

- A. Field Jointing: Where possible make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
1. Secure field joints in plastic-laminate countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.
- B. Secure tops to cabinets with Z- or L-type fasteners or equivalent, using two or more fasteners at each front, end, and back.
- C. Abut top and edge surfaces in one true plane, with internal supports placed to prevent deflection.
- D. Seal junctures of tops, splashes, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

3.4 CLEANING AND PROTECTING

- A. Repair or remove and replace defective work as directed on completion of installation.
- B. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Commissioner.

- C. Protection: Provide 6-mil plastic or other suitable water-resistant covering over countertop surfaces. Tape to underside of countertop at a minimum of 48 inches o.c. Remove protection at Substantial Completion.

END OF SECTION 123200

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 124813

ENTRANCE FLOOR MATS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. LEED BUILDING - GENERAL REQUIREMENTS:

The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SUMMARY

- A. This Section includes the following:

1. Entrance mats

- B. Related Sections include the following:

1. Construction Waste Management and Disposal - Section 017419
2. Sustainable Design Requirements (LEED Building) - Section 018113
3. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3
4. Construction IAQ Requirements - Section 018119
5. Cast-in-Place Concrete Section 033000

1.3 ACTION SUBMITTALS

- A. LEED BUILDING Submittal Requirements:

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Sustainable Design Requirements (LEED Building) - Section 018113 of these specifications.

2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
 3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
 4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
 5. The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the LEED Consultant for review.
- B. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- C. Samples for Initial Selection: For each type of product indicated.
- D. Samples for Verification: For each type of product indicated.
1. Floor Mat: 12-inch- square, assembled sections of floor mat.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For floor mats to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.
- A. Accessibility Requirements: Provide installed floor mats that comply with Section 4.5 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)." Sections 302 and 303 in ICC A117.1.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Indicate measurements on Shop Drawings.

1.7 COORDINATION

- A. Coordinate size and location of recesses in concrete with installation of finish floors to receive floor mats.

PART 2 - PRODUCTS

2.1 ENTRANCE MATS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide Chilewich Woven flootmat in Basketweave texture, Chestnut color or a comparable product by one of the following:
 - 1. Waterhog Classic Entrance mats
 - 2. Duromat DM

2.2 FABRICATION

- A. Floor Mats: Shop fabricate units to greatest extent possible in sizes indicated. Unless otherwise indicated, provide single unit for each mat installation; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in mats are necessary, space symmetrically and away from normal traffic lanes. Miter corner joints in framing elements with hairline joints or provide prefabricated corner units without joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and floor conditions for compliance with requirements for location, sizes, and other conditions affecting installation of floor mats and frames.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install surface-type units to comply with manufacturer's written instructions at locations indicated; coordinate with entrance locations and traffic patterns.
 - 1. Anchor fixed surface-type frame members to floor with devices spaced as recommended by manufacturer.

3.3 PROTECTION

- A. After completing frame installation and concrete work, provide temporary filler of plywood or fiberboard in recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Substantial Completion.

END OF SECTION 124813

SECTION 142120

COUNTERWEIGHTED ROPED HYDRAULIC ELEVATOR

PART 1 - GENERAL

1.1 DEFINITIONS OF TERMS

- 1.1.1 The term "CONTRACT" OR "CONTRACT DOCUMENTS", as used herein, consists of the Agreement, Bidding Information, Conditions of Contract, Specifications and includes any Alternates or Addenda issued during the bidding period.
- 1.1.2 The term "CONTRACTOR" OR "ELEVATOR CONTRACTOR", as used herein, refers to any persons, partners, firm or corporation having a contract (with the General Contractor retained by the City of New York) to furnish labor and materials for the execution of the work herein described.
- 1.1.3 The term "SUBCONTRACTOR", as used herein, refers to any persons, partners, firm or corporation having materials and/or labor for the execution of the work herein described.
- 1.1.4 Words in the singular shall mean the plural whenever applicable or as the context so indicates.
- 1.1.5 All terms in these specifications have the definition given in the 2003 edition of the American Society of Mechanical Engineers, ASME A17.1, Safety Code for Elevators and Escalators.

1.2 INTENT

- 1.2.1 The following specification provides for the installation of one (1) new roped and pulling oil hydraulic elevator.
- 1.2.2 All of the elevator equipment shall be designed, constructed, installed and adjusted to secure the best commercial available results with respect to smooth, quiet, convenient and efficient operation, durability, economy of maintenance and operation, and the highest standard of safety.
- 1.2.3 The intent of these specifications is to establish the requirements and quality standards for the new elevators. It is not the intent of these specifications to detail the construction and design all of the parts of the equipment, but it is expected that the type, materials, design, quality of work and construction of each and every part shall be fully adequate for the service required, durable, properly coordinated with all other parts, in accordance with the best commercial standards applicable and of the highest commercial efficiency possible.

- 1.2.4 All electric and magnetic circuits and related parts shall be of ample and proper size, design and material to avoid injurious heating and arcing, and all other objectionable effects which may reduce the efficiency of operation, economy of maintenance and/or net-useful life of the apparatus.
- 1.2.5 Minimum requirements for design, materials, etc., are given herein for certain parts of the equipment. Equivalent requirements approved by the Commissioner shall apply to such parts as are of special design, construction or material and to which the specified requirements are not directly applicable. These minimum requirements as a whole shall also be considered as establishing proportionate general minimum standards for all parts or the equipment.
- 1.2.6 General requirements for design, materials and construction are intended primarily to apply to the heavy-duty and important parts of the equipment specifically mentioned and to other parts of similar duty and importance. Less important and light-duty parts may be of the standard design, materials and construction provided that, in the opinion of the Commissioner, such standards are in accordance with the best commercial elevator practice and are fully adequate for the purpose of use. All such variations shall be made only on the Commissioner's written approval.
- 1.2.7 All new equipment and component parts installed, supplied or provided under this contractual procedure shall be manufactured and distributed by a third-party, non-installer company servicing the vertical transportation industry.
- a. Apparatus shall conform to the design and construction standards referenced herein, and shall be rated the best commercial grade suitable for this application.
 - b. Equipment and component systems shall not employ any experimental devices or proprietary designs that could hamper and/or otherwise prohibit subsequent maintenance repairs or adjustments by all qualified contractors.
 - c. Manufacturers of the new apparatus shall provide technical support and parts replacements for their equipment and component systems for a minimum of twenty (20) years, and issue such guarantee of support to the City of New York with written certification naming the final City of New York of their product(s) to ensure the apparatus or systems remain maintainable regardless of who may be selected for future service.
- 1.2.8 The Contractor shall not use as part of the permanent equipment any experimental devices, proprietary design, components, construction of materials which have not been fully tried out in at least substantially similar or under comparable service, except as may be especially approved by the Commissioner. If any important equipment or devices to be used on this installation differ substantially in construction, materials, design, size, capacity or duty from corresponding items previously used for the same purpose by the manufacturer, they shall pass such tests as the Commissioner may require to fully show their adequacy and suitability. These tests shall be in addition to tests herein specified and shall be made at the expense of the Contractor.

- 1.2.9 Certain design limitations, tests, etc., are herein specified as a partial check of the adequacy of design, construction and materials used. These requirements do not cover all features necessary to ensure satisfactory and approved operation, etc., of the equipment.
- 1.2.10 It is understood, the entire system shall be designed, fabricated, modified and/or upgraded in full compliance with applicable local laws and code standards. The absence of a particular item or requirement shall not relieve the Contractor of the full and sole responsibility for such equipment, features and/or procedures.
- 1.2.11 With the exception of only those items specifically identified as being performed by others, the Specifications are intended to include all engineering, material, labor, testing, and inspections needed to achieve work specified by the Contract Documents. Inasmuch as it is understood that any incidental work necessary to complete the project is also covered by the Specifications, bidders are cautioned to familiarize themselves with the existing job site conditions. Additional charges for material or labor shall not be permitted subsequent to execution of the Contract.
- 1.2.12 Bidders must report discrepancies or ambiguities occurring in the Specifications to the Commissioner for resolution prior to the bidding deadline, otherwise the Specifications shall be deemed acceptable in their existing form.
- 1.2.13 The Form of Agreement constituting a contract between the City of New York and Contractor shall include all applicable provisions as specified herein, and shall not diminish any relative requirements except by direct reference to a particular contingency or general condition.
- a. Should a conflict between the specification and selected Form of Agreement arise, the condition of greatest magnitude or depth benefiting the City of New York shall prevail, and the Form of Agreement shall be amended accordingly.

1.3 ABBREVIATIONS AND SYMBOLS

- 1.3.1 Abbreviations an Associations, Institutions, and Societies which may appear in the Project Manual or elsewhere in the Contract Documents, shall mean the following:

AHJ	Authority Having Jurisdiction (New York City Department of Buildings)
AIA	American Institute of Architects
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
BOCA	Building Officials and Code Administrators International, Inc. - Basic National Building Code
IBC	International Building Code
IEEE	Institute of Electrical and Electronics Engineers
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Agency

1.4 MATERIALS AND QUALITY OF WORK

- 1.4.1 All materials are to be new and of the best quality of the kind specified. Installation of such materials shall be accomplished in a neat manner and be of the highest quality. In case the Contractor should receive written notification from the City of New York stating the presence of inferior, improper, or unsound materials or quality of installation, the Contractor shall, within twenty-four (24) hours proceed to remove such work or materials and make good all other work or materials damaged thereby. If the City of New York permits said work or materials to remain, the City of New York shall be allowed the difference in value or shall, at its election, have the right to have said work or materials repaired or replaced as well as the damage caused thereby, at the expense of the Contractor, at any time within one (1) year after the completion of the work; and neither payments made to the Contractor, nor any other acts of the City of New York shall be construed as evidence of acceptance and waiver.

1.5 CHANGES IN SCOPE OF WORK

- 1.5.1 The City of New York reserves the right to revise the scope of work encompassed by the Specifications any time prior to final acceptance of the completed project. Each such addition or deletion to the Contract shall require the City of New York and the Contractor to negotiate a mutually acceptable adjustment in the contract price, and, for the Contractor to issue a change order describing the nature of the change and the amount of price adjustment. Each change order shall be executed by the Contractor, City of New York, and the Commissioner.

1.6 CHANGES AND EXTRA WORK

- 1.6.1 The City of New York may at any time make changes in the specifications, plans and drawings, omit work, and require additional work to be performed by the Contractor. For such additional work to be performed hereunder, City of New York shall pay Contractor on the basis of a mutually agreed to lump sum or cost thereof, and a mutually fixed or percentage fee. The Contractor shall make no additions, changes, alterations or omissions or perform extra work except on prior written authorization of the City of New York.

1.7 COMMISSIONER'S STATUS

- 1.7.1 The Commissioner shall act as a representative of the City of New York and Commissioner on matters pertaining to technical work covered in the Specifications. The Commissioner shall interpret the Contract Documents for technical requirements, approve technical shop drawings, conduct periodical examinations of the work in progress, and perform final evaluations of all completed work specified by the Contract Documents prior to acceptance by the City of New York.

1.8 CODES AND ORDINANCES

1.8.1 All work specified by the Contract Documents shall be performed in full compliance with applicable Federal, State, and municipal codes and ordinances that are in effect at the time of Contract's execution. Regulations of the governing building inspection department shall be fulfilled by the Contractor and Subcontractors. The entire elevator plant, when completed, shall conform with all applicable regulations set forth in the latest editions of:

- a. Local and/or State laws applicable for logistical area of project work (New York City IBC-2008).
- b. Safety Standard for Elevators and Escalators, ASME A17.1-2000/2003. As modified by NYC code Appendix "K".
- c. Guide for Inspection of Elevators, Escalators, and Moving Walks, ASME A17.2.
- d. New York City Electrical Code.
- e. American With Disabilities Act - Accessibility Guidelines for Building and Facilities.

1.8.2 The Elevator Contractor shall advise the City of New York's Representative of pending code changes that could be applicable to this project or property and provide quotations for compliance with related costs.

1.9 PERMITS

1.9.1 Prior to commencing any work specified by the Contract Documents, the Contractor shall, at its own expense, file the necessary drawings and documents to obtain whatever permits or variances may be required by the City and municipal governing authorities. The Contractor shall further provide satisfactory evidence of having obtained said permits and variances to both the City of New York's Representative and Commissioner.

- a. Note use of the "MRL" type system specified. Obtain AHJ approval prior to ordering materials and equipment.

1.10 SUBMITTALS

1.10.1 Prior to the beginning of the work, the Contractor shall submit and have approved copies of layout drawings, shop drawings and standard cuts. These items shall include a plan view of the hoistway and machine room, elevation of the pit, and all accessories. The Commissioner shall pass on the submittals with reasonable promptness and the Contractor shall be responsible to ensure that there will be no delay in their work or that of any other trade involved.

- a. Particular attention shall be given to the specific type of system and all relative requirements of the AHJ to include hoistway entrance design application and control closet access provisions at First Floor landing.

- b. Approved filing and submittal requirements must be completed before new equipment and related materials are ordered.
 - c. Copies of Department of Buildings' permits and/or governing authority's documents will be posted at the job site with extra copies issued to the Commissioner.
- 1.10.2 Samples of wood, metal, plastic, paint or other architectural finish material applicable to this project shall be submitted for approval by the City of New York's designee.
- 1.10.3 It shall be distinctly understood that approval of the drawings and cuts the Commissioner shall be for general arrangement only and does not include measurements which are the Contractor's responsibility or approval of variations from the contract documents required for the governing authorities.
- a. The Contractor shall prepare a record log and maintain all submittals, shop drawings, catalog cuts and samples.
- 1.10.4 Submit the following

1. Samples

<u>Item No.</u>	<u>Quantity</u>	<u>Size</u>	<u>Description</u>
S1	3	12" x 12"	Exposed architectural finishes of each type

The samples shall:

- a. Be held on site after inspection and used as a standard for acceptance or rejection of subsequent production units.

Subject to approval, where an item of equipment is a standard item, copies of the manufacturer's catalogue or brochure may be accepted provided that all dimensions and relevant information are shown in the catalogue or brochure.

2. Shop Drawings

- a. Fully dimensioned hoistway plan and section indicating:
 - (1) Platform (with cab), hoistway and entrance dimensions
 - (2) All running clearances with roped counterweight
 - (3) Location of fixtures
 - (4) Machine room (i.e., control closet)

(5) Buffers, service ladders and pit reactions

(6) Location of inserts (Installation by Elevator Contractor)

- b. Entrance details and fire-rating
- c. Fixture details including indicators, hall pushbutton stations, car operating panel, etc.
- d. Wiring diagrams (controls and hoistway)
- e. Cab details including wall, ceiling, base, handrail, lighting, fixtures, front return and transom plans and sections.

3. Calculations

- a. Rail loads (horizontal and vertical)
- b. Pit reactions (roped and counterweighted application)
- c. Heat emissions in machine room closet
- d. Electrical loads including starting, accelerating and running currents. Include all auxiliary loads.
- e. Jack loads
- f. Submit design calculations identifying seismic design forces and support capacities. Calculations shall be certified by a New York State registered professional engineer.

1.11 MEASUREMENTS AND DRAWINGS

- 1.11.1 Any drawings or measurements included with the bidding material shall be for the convenience of the bidders only. Complete responsibility for detailed dimensions lies with the Contractor. In the execution of the work on the job, the Contractor shall verify all dimensions with the actual conditions. Where the work of the Elevator Contractor is to join another trade, the shop drawings shall show the actual dimensions and the method of joining the work of the two trades.

1.12 PROGRESS OF WORK

- 1.12.1 Upon signing of the contract, the Contractor shall submit, within two weeks, a complete starting and completion schedule, including equipment delivery dates based on the information submitted on the bid form and confirmed delivery dates for selected materials, components, fixtures and cab enclosures as applicable to the project.
- 1.12.2 The Contractor shall submit in writing the following information to the Commissioner throughout the construction period:
- a. A completion schedule, including equipment delivery times and anticipated completion dates for each project work phase.
 - b. A schedule of values to be used for itemized progress payments (material and labor itemized breakdown).
 - c. A progress report with submission of each payment request, or upon request of the Commissioner, showing the progress being made and the percentage of the job completed and shall certify to the Commissioner that labor and materials listed on the request for payment have been performed or installed.

1.13 GUARANTEE

- 1.13.1 The Contractor agrees to certify that work performed in accordance with the Contract Documents shall remain free of defects in materials and quality of work for a period of one (1) year after final acceptance of the completed project, or acceptance thereof by beneficial use on a unit by unit basis, which ever occurs first. The sole duty of the Contractor under this warranty is to correct any non-conformance or defect and all damages caused by such defect without any additional cost to the City of New York and within fifteen (15) days of notification. The express warranty contained herein is in lieu of all other warranties, express or implied, including any warranty of merchantability or fitness for a particular purpose. In the event the Contractor fails to fulfill its obligations defined herein, the City of New York shall have the express right to perform the Contractor's obligations and to charge the Contractor the cost of such performance or deduct an equal amount from any monies due the Contractor.

1.14 REMOVAL OF RUBBISH AND EXISTING EQUIPMENT

1.14.1 On a scheduled basis, the Contractor shall remove from the job site all rubbish generated in performing work specified in the Contract Documents.

1.14.2 The Contractor agrees to dispose of the aforementioned equipment and rubbish in accordance with any and all applicable Federal, State, and municipal environmental regulations. The Contractor further accepts all liability that may result from handling and/or disposing of said material.

1.15 PAINTING AND FINISHES (GENERAL)

1.15.1 No less than two (2) coats of rust inhibiting machinery enamel shall be applied to exposed ferrous metal surfaces in both the hoistway and pit that do not have a galvanized, anodized, baked enamel, or special architectural finishes.

1.15.2 Prior to seeking final acceptance of the completed work as specified by the Contract Documents, the Contractor shall apply two (2) coats of rust inhibiting enamel paint to the elevator machinery located within the machine room and secondary level as well as to the machine room floors.

1.15.3 Architectural metal surfaces of bronze or similar non-ferrous materials which, under the Specifications, are to be refinished, re clad and/or provided new, shall be sufficiently clear coated so as to resist tarnishing during normal usage for a period of not less than twelve (12) months after final acceptance by the City of New York.

1.16 KEYS

1.16.1 Upon the initial acceptance of work specified by the Contract Documents, the Contractor shall deliver to the City of New York, ten (10) keys for each new general key-operated device that is provided in accordance with ASME A17.1, Article 8.1.1 Standards.

1.16.2 All other keying of access or operation of equipment shall be provided in accordance with ASME A17.1 Article 8.1.2 through 8.1.5.

1.17 DIAGNOSTIC TOOLS

1.17.1 Prior to seeking final acceptance of the completed project as specified by the Contract Documents, the Contractor shall deliver to the City of New York any specialized tool(s) that may be required to perform diagnostic evaluations, adjustments, and/or programmable software changes on any unit of microprocessor-based elevator control equipment installed by the Contractor. Any and all such tool(s) shall become the property of the City of New York.

a. Any diagnostic tool provided to the City of New York by the Contractor shall be configured to perform all levels of diagnostics, systems adjustment and software program changes which are available to the Contractor.

b. In those cases where diagnostic tools provided to the City of New York require periodic re-calibration and/or re-initiation, the Contractor shall perform such

tasks at no additional cost to the City of New York for a period equal to the term of the maintenance agreement from the date of final acceptance of the completed project.

- c. During those intervals in which the City of New York might find it necessary to surrender a diagnostic tool for re-calibration, re-initiation or repair, the Contractor shall provide a temporary replacement for the tool at no additional cost to the City of New York.

- 1.17.2 The Contractor shall deliver to the City of New York, printed instructions for the proper use of any tool that may be necessary to perform diagnostic evaluations, systems adjustment, and/or programmable software changes on any unit of microprocessor-based elevator control equipment installed by the Contractor. Accompanying the printed instructions shall be any and all access codes, passwords, or other proprietary information that is necessary to interface with the microprocessor-control equipment.

1.18 WIRING DIAGRAMS AND OPERATING MANUALS

- 1.18.1 Prior to seeking final acceptance of the completed project as specified by the Contract Documents, the Contractor shall provide to the City of New York, two (2) identical volumes of printed information organized into neatly bound manuals. Those manuals shall comprise the following:

- a. Step-by-step adjusting, programming and troubleshooting procedures that pertain to the solid-state microprocessor-control equipment.
- b. Passwords or identification codes required to gain access to each software program in order to perform diagnostics or program changes.
- c. A composite listing of the individual settings chosen for variable software parameters stored in the software programs of both the motion and dispatch controllers.

- 1.18.2 In conjunction with the aforementioned operating manuals, the Contractor shall also provide two (2) sets of "AS INSTALLED" straight-line wiring diagrams in accordance with the following requirements:

- a. In addition to displaying name and symbol of each relay, switch or other electrical component utilized, the diagrams shall identify each wiring terminal.
- b. Electrical circuits depicted shall include all those which are hard wired in both the machine room and hoistway.
- c. Supplemental wiring changes performed in the field shall be incorporated into the diagrams in order to accurately replicate the completed installation.

PART 2 - OPERATION/PRODUCTS

Bronx River Art Center
1087 East Tremont Avenue, Bronx, NY

Counterweighted Roped Oil Hydraulic Elevator
142120 - 10

2.0 WORK INCLUDED (SCOPE OF WORK)

2.0.1 The extent of the work specified provides for installation of one (1) new Leistriz Corporation (Model Emarelle) pulling-type roped and counterweighted elevator system or approved equal.

- a. Work of this section includes all labor, materials, tools, equipment, appliances, and services required for a complete elevator installation as specified herein and/or as required by job conditions.

2.1 GENERAL DESCRIPTION

2.1.1. Passenger Elevator

- a. Quantity – One (1) counterweighted roped pulling oil hydraulic application
- b. Type - Passenger
- c. Capacity (lbs.) – 3,500
- d. Speed (fpm) – 200
- e. Travel in Feet - Approximately 49'-9½" to be confirmed by Commissioner
- f. Number of Landings – Five (5)
- g. Number of Openings – Five (5)
- h. Front - All @ 1st, 2nd, 3rd, 4th, and R
- i. Side/Rear - None
- j. Operation - Simplex selective collective automatic push button
- k. Control - AC for hydraulics (G.A.L. Galaxy or Approved Equal) with an electronic valve by Leistriz Corp.
- l. Number of Pushbutton Risers - One (1)
- m. Platform Size – 6'-0" wide x 7'-8" deep, with 5'-8" wide by 6'-9" deep clear inside.

n.	Guide Rails -	Integral steel tees - Provide rail backing as required with all bracketing and support structures by Elevator Contractor.
o.	Buffers -	Spring
p.	Cab -	New as specified
q.	Car Door Size -	4'-0" wide x 7'-0" high
r.	Hoistway Door Size -	4'-0" x 7'-0"
s.	Door Operation -	Two speed, side opening
t.	Fixture and Signals -	As further specified per ADA Standards
u.	Machine Type -	Hydraulic pump (40 HP AC motor)
v.	Pump / Control Location -	First Floor closet
w.	Roping -	Pulling cylinder 1:2 roping ratio
x.	Power Supply -	208-3-60 (New By Others)

2.2 RELATED WORK BY THE ELEVATOR CONTRACTOR (INCLUDED IN BASE BID)

2.2.1 The following requirements shall be applicable based on prevailing conditions at the site of work and/or mandated modifications for code compliance.

- a. Installation of new electrical conduit and power feeders between the load side of new main line disconnect switch and new elevator control equipment in machine room.
- b. Provide elevator pit and overhead area with a 110-volt GFI duplex receptacle and a permanent lighting fixtures equipped with protective guard. Illumination shall be no less than 10 foot-candles at pit floor level. A light control switch must be provided and so positioned as to be readily accessible from the pit access.
- c. Provide bottom terminal pit access with a permanent fixed metal ladder designed and located in accordance with ASME A17.1 standards.
- d. Installation of guide rail inserts and bracketing.
- e. Installation of sill supports.
- f. Coordination of work by others and relative scheduling to execute project on a timely basis.

2.3 MAINTENANCE COVERAGES

2.3.1 The following maintenance coverages apply:

2.3.1.1 Guarantee Maintenance

- a. Provide full comprehensive preventative maintenance services for a period of twelve (12) months after the final completion and acceptance of the elevator.
- b. Guarantee maintenance and related services shall be provided in accordance with the City of New York's Form of Agreement issued with the documents for guarantee and subsequent services.

2.4 RELATED WORK BY OTHERS

- 2.4.1 General construction of hoistway and relative building systems.
- 2.4.2 Installation of new main line 208-volt power feed with related disconnect switch designed and located per local law requirements (40 HP motor).
- 2.4.3 Installation of auxiliary 110-volt power feed with related distribution panel(s) and disconnect(s) designed and located per local law requirements. (External locking with minimum of two [2] 15-amp breakers.)
- 2.4.4 Installation of hoistway and machine room closet smoke relief venting provisions in accordance with local laws. (Includes control closet at First Floor.)
- 2.4.5 Installation of machine room closet and lighting per code.
- 2.4.6 Installation of telephone line for emergency communication and remote electronic valve control adjustments. (Terminate outside phone line at elevator control cabinet.)
- 2.4.7 Installation of fire emergency control interface provisions per local law.
- 2.4.8 Installation of machine room closet with access doors self-closing and locking provisions per code.
- 2.4.9 Installation of ABC-type fire extinguisher in machine room closet.
- 2.4.10 Installation of fire emergency control interface provisions for automatic recall of the elevator(s) through operation of the fire detection system. The interfacing contacts shall be wired to an electrical junction box located inside elevator machine room for connection to the elevator control systems by the Elevator Contractor. Each wire shall be clearly labeled with its control function. Coordinate the type of interface required for the specific elevator control apparatus with the Elevator Contractor.

- 2.4.11 Installation of HVAC provisions inside the machine room closet so as to maintain ambient temperature and humidity levels that are within the range specified by the microprocessor-control equipment manufacturers.

2.5 FIXED HOISTWAY EQUIPMENT

2.5.1 Guide Rails, Inserts and Brackets

- a. Provide machined, standard size steel T section guide rails with tongue and grooved joints. Use not less than 15.0 pound rails.
- b. The section modulus and moment of inertia of the fishplates shall not be less than that of the rail. Connect rails to fishplate with four (4) bolts.
- c. Furnish and install rail brackets and inserts. (Turn-key guide rail installation.)
- d. Brackets shall be used to support the rails from the existing hoistway framing and/or new inserts. The rails shall be attached to the brackets by heavy clamps or clips. Bolting or welding rails to brackets shall only be allowed in certain instances. Do not attach brackets to the top flange of hoistway framing steel.
- e. Provide rail backing where the vertical distance between support framing is greater than 14'-0" and less than 16'- 0", and no intermediate support framing is shown on the drawing.
- f. All guide rails shall be erected plumb and parallel to a maximum deviation of 1/8 inch (plus or minus 1/16 inch).
- g. Provide oversized steel members and brackets for the rails to be used as vertical supporting members for overhead structures and wire rope sheaves.

2.5.2 Buffers

- a. Provide spring type buffers. The buffers shall comply in with the requirements of the ASME Code. Support buffers from the new pit floor with all required blocking and steadying steel members.
- b. The buffers shall be tested by a qualified testing laboratory and approved as complying with the ASME Code. The buffers marking plates shall be permanent and legible indicating the manufacturer's name, identification number and stroke.
- c. As required, provide buffer access platforms.

2.5.3 Normal and Final Terminal Stopping Devices

- a. Provide normal terminal stopping devices to stop the car automatically from any speed obtained under normal operation within the top and bottom overtravels independent of the operating devices, final terminal stopping device and the buffers.
- b. Provide emergency terminal speed limiting devices to ensure that the plunger does not strike its stop ring at more than 100 fpm.
- c. The terminal stopping devices shall have rollers with rubber or other approved composition tread to provide silent operation when actuated by the fixed cam in the hoistway.

2.5.4 Interlocks, Contacts and Unlocking Devices (GAL Type "MO")

- a. Equip each elevator hoistway door with a positive interlock which shall prevent the operation of the elevator unless all elevator doors are closed and maintained closed when elevator is away from the landing. The interlocks shall also prevent the opening of a hoistway door from the landing side unless the car is within the landing zone and is either stopped or being stopped at that level. Design interlocks so that they are not easily accessible from the landing side.
- b. Provide electric contacts on top of emergency exit to prevent the operation of the elevator when the electric contacts are not closed.

2.5.5 Hoistway/Car Door Hangers, Sheaves and Tracks (GAL Corp. Equipment)

- a. Provide a sheave type two-point suspension hanger and track for each hoistway and car door. Sheaves shall be hardened steel with polyurethane tire, not less than 3 1/4 inches in diameter with sealed grease packed precision ball bearing.
- b. The upthrust shall be taken by a roller mounted on the hanger and arranged to ride on the underside of the track.
- c. The track shall be of formed cold rolled steel or cold drawn steel and shall be rounded on the track surface to receive the hanger sheaves. The track shall be removable and shall not be integral with the header.

2.5.6 Stop Switches

- a. Provide a readily accessible switch for stopping and maintaining the elevator out of service in pit, on top of car, at the overhead access and if required by Code, in car operating panel.

2.5.7 Hoistway Entrance Structure

- a. Frames - The frames shall be constructed of 14 gauge stainless steel with No. 4 brushed finish as approved by Commissioner.
 - (1) Provide unit frames with welded and mitered corners ground smooth.
- b. Doors - Provide finished doors to match new frames. The doors shall be constructed of 16 gauge stainless steel with No. 4 brushed finish, not less than 1-1/4" thick, reinforced to accept hangers, interlocks or door closers. Equip all hoistway landing doors with one-piece full height non-vision wings of material and finish to match hall side of door panels.
- c. Entrances shall bear 1 1/2 hour label of Underwriters Laboratories, Inc.
- d. Provide each door panel with two removable laminated plastic composition guides, arranged to run in sill grooves with a minimum clearance. The guide mounting shall permit their replacement without removing the door from the hangers. A steel fire stop shall be encased in each guide.
- e. Provide rubber bumpers at the top and bottom of the doors to stop them at their limit of travel in opening and closing direction.

- f. Sills - Provide extruded aluminum sills with the nosing approximately one (1) inch deep and running the full length of door travel. The sills shall be at least 3/8 inch thick. The wearing surface shall be of a non-slip type with the door guide grooves providing a minimum clearance for the guides. Rigidly secure the sills to the building construction by means of steel sill support brackets or blocking with necessary metal shimming or adjustments within hoistway framing. (Sill supports by Elevator Contractor.)
- g. Provide a special key so that an authorized person can open any landing door when the car is elsewhere. The key hole shall be fitted with metal ferrule that matches the door finish.
- h. Struts - Struts shall be hot rolled steel angles not lighter than 3 inches by 3 inches by 1/4 inch or shall be formed of 8 gauge sheet steel. Extend the struts from top of sill to either the bottom of floor beam or intermediate framing above. Bolt struts in place with not less than two (2) bolts at each end. Strut clip angles or brackets shall have a thickness not less than the thickness of the supported strut.
- i. Track Support - 3/16 inch thick steel track support plate shall extend between and be bolted to the vertical steel struts with no less than two (2) bolts at each end.
- j. Track Covers - 14 gauge steel coverplates shall extend the full travel of the doors. Covers shall be made in sections for service access to hangers, sheaves, tracks and interlocks. The sections above the door opening shall be movable from within the elevator car. Cover fastening devices shall be non-removable from the cover.
- k. Fascias - 14 gauge steel fascia plates shall extend at least the full width of the door and be secured at hanger support and sill with oval head machine screws.
- l. Provide fascia plates where the clearance between the edge of the loading side of the platform and the inside face of the hoistway enclosure exceeds the code allowed clearance.
- m. Toe Guards - Provide 14 gauge steel toe guards to extend 12 inches below any sill not protected by fascia. The toe guards shall extend the full width of the door and shall return to the hoistway wall at a 15 degree angle and be firmly fastened.
- n. Dust Covers - Provide 14 gauge steel dust covers to extend 6 inches above any header not protected by fascia. The dust covers shall extend to a full width of travel of the doors, return to the hoistway wall at a 15 degree angle and be firmly fastened.

(1) Label doors with floor numbers 4 inches high.

2.5.7A Zero-Clearance Security/Weather Corridor Door (Roof Landing)

- a. Provide a flush design swing-type stainless steel security access door at the roof landing.
- b. The door shall be secured to the slide door entrance frames using concealed hinges and tamper-proof hardware.
- c. Provide door with:
 - (1) An automatic locking mechanism keyed to match building apparatus.
 - (2) Operating handle (knob) on exterior and push plate on interior side.
 - (3) A mechanical locking mechanism. A self-closing device and a "Hold Open" device.
- d. The door shall be hung to ensure the clearance between the elevator system slide door and security swing door panel is no greater than five inches (5").
- e. Finish the door panel to match the new stainless steel entrance assembly.
- f. **NOTE:** Provide weather strip/permanent seal all around entrance door to prevent water intrusion and protect elevator system from the elements.

2.5.8 Hoistway Access Switch

- a. Install a cylindrical type keyed switch at top terminal in order to permit the car to be moved at slow speed with the doors open to allow authorized persons to obtain access to the top of the car.
- b. Where there is no separate pit access door, a similar switch shall be installed at the lowest landing in order to permit the car to be moved away from the landing with the doors open in order to gain access to the pit.
- c. Locate the switch outside the terminal floor entrance jambs with separate faceplate at a height of 78 inches above the finished floor.
- d. This switch is to be of the continuous pressure spring-return type, and shall be operated by a cylinder-type lock having not less than a five (5) pin or five (5) disc combination with the key removable only in the "OFF" position. The lock shall not be operable by any key which operates locks or devices used for other purposes in the building and shall be available to and used only by inspectors, maintenance men and repairmen.

2.5.9 Governor and Safeties

- a. Provide a governor-activated gradual application safety in accordance with ASME Standards.
 - (1) Equip safety with an electrical switch that shall be activated before or at the time of safety application to disconnect power to the control operating unit.
- b. Provide a speed governor to operate the safety in accordance with local law.
 - (1) Maintain the proper tension in the governor rope with a weighted tension sheave located in the pit or overhead. Springs used to develop the tension are not acceptable.
 - (2) Provide rope grip jaws, designed to clamp the governor rope to actuate the car safety upon a predetermined overspeed downward. Rope grip jaws directly coupled to the governor mechanism so as to float with governor movement shall not be permitted.
 - (3) Centrifugal type governors shall trip and set rope jaws within 60 degrees of governor sheave rotation after reaching rated tripping speed.
 - (4) Design the governor rope tripping device so that no appreciable damage to or deformation of the governor rope shall result from the stopping action of the device in operating the car safety.
 - (5) Provide an electrical governor overspeed protective device which, when operated, shall remove power from the driving machine motor and brake before or at the application of the safety. The setting for the overspeed switches shall be as prescribed in the ASME A17.1 Code.
 - (a) Locate and enclose the switch to insure that excess lubrication will not enter the switch enclosure.
 - (b) Overspeed switches shall operate in both direction of travel on systems employing static power drive units.
 - (6) Seal and tag the governor with the running speed, tripping speed and date last tested.

2.5.10 Overhead Deflector Sheaves and Structures

- a. Provide overhead 1:2 ratio wire rope cable deflector sheaves with related apparatus and structural mounting system using guide rails to support vertical reaction forces down at the pit floor above the existing grating.
- b. Locate and size new sheaves to maximize for car and counterweight hitch drops. Modify grating to suit new equipment and wire rope penetrations.

- c. Deflector sheave support bearings shall be of a roller type designed for a minimum of twice the total load calculation equipped with pressure activated or other suitable lubrication devices.
- d. Provide sheave guards for all apparatus and secure same to supporting elements above floor grating.

2.6 MOVING HOISTWAY EQUIPMENT

2.6.1 Top of Car Station

- a. Mount an inspection station on top of car. This device shall be code compliant, activated by a switch located in car operating panel and shall include the minimum provisions:
 - (1) Up and down direction buttons
 - (2) A stop switch
 - (3) A 110 volt GFCI duplex receptacle
 - (4) A work light with wire guard and a "off"-"on" switch
 - (5) Fire service signals.
- b. When the station is operational all operating devices in the cab shall be inoperative.

2.6.2 Guide Shoes

- a. Provide roller guide shoes with adjustable mounting base, rigidly bolted to the top and bottom of each side of the car frame.
 - (1) Roller guides shall consist of a set of sound reducing neoprene wheels in precision bearings held in contact with the three finished rail surfaces by adjustable stabilizing springs.
 - (2) The bearings shall be provided with grease fittings for lubrication.
 - (3) Equip roller guides with adjustable stops to control postwise float.
 - (4) Fit the top car roller guides with galvanized, 16 gauge steel guards.
- b. Provide suitable guides and/or shoes for the traveling wire rope sheave assembly with relative supports and mounting apparatus.

2.6.3 Car Frame and Platform

- a. The car frame shall be made of steel members, with a factor of safety as required by the ASME Standards applicable.
 - (1) The stresses and deflection in the car frame and platform members and their connections, based on static load imposed on them, shall be not more than those permitted by Code.
- b. The car platform shall consist of a steel frame with necessary steel stringers, all securely welded together. The frame and platform shall be so braced and reinforced that no strain will be transmitted to the elevator car.
 - (1) Provide platform with two (2) layers of 3/4" thick marine grade plywood. Cover the underside of the car platform with sheet steel.
- c. Provide extruded aluminum threshold having non-slip surface, guide grooves.
- d. Platform shall be provided with vibration isolation pads. The support frame shall carry rubber pads on which the platforms shall rest without any connection to the steel frame.
- e. Recess the elevator platform to receive finished flooring as selected by the Commissioner.
- f. Allow for a maximum cab height as approved by Commissioner.

2.6.4 Door Equipment

- a. Mount a GAL Type "MOVFR" high speed VF-AC operator with a minimum of 1/2 HP motor on top of car to operate the car and hoistway door simultaneously.
- b. The door shall operate smoothly without a slam during both opening and closing cycles. Door velocity shall be adjustable and continuously monitored to maintain minimum floor-to-floor performances and door operation times.
- c. Use a sill-mounted spring closer to automatically close the hoistway door if the car, for any reason, leaves the landing zone.
- d. The car and the hoistway doors shall open as the car stops at the landing and close before the car can leave the floor.
- e. Door Contact - Equip the car door with an electric contact which will prevent operation of the car unless the car door is in the closed position. The door contacts shall not be readily accessible from the inside of the car.
- f. Nudging - If the doors are held open for a predetermined time (15 to 20 seconds; individually adjustable) by interrupting the light rays/detector field, or by holding the door, or by pressing the door open button, a buzzer will sound and the doors shall start to close at a gentle slow speed.

g. Detector Edge: (TRI-TRONICS OR JANUS)

- (1) Provide an infrared curtain door protection system on car door(s).
- (2) The doors shall be prevented from closing from an open position if a person interrupts any one of the light rays. When the doors are closing, any interruption of the protective light field shall cause both the car and corridor doors to reverse. The doors shall start to close when the protection system is free of any obstruction.
- (3) The infra-red curtain protective system shall have:
 - (a) Height of protective field not less than 72" above the sill.
 - (b) Where horizontal infra-red light beam system is used:
 - A minimum of 40 light beams
 - Accurately positioned infra-red lights to conform to the requirements of the applicable handicapped code.
 - (c) Modular design to permit on board test operation and replacement of all circuit board without removing the complete unit.
 - (d) Controls to shut down the elevator when the unit fails to operate properly.

2.6.5 Jack Unit

- a. Design and construct the jack unit in accordance with the applicable requirements of the ASME Code. It shall be of sufficient size to pull the counterweight down in order to lift the gross load at the rated speed to the height specified and shall be factory tested to ensure adequate strength and freedom from leakage. No brittle material, such as grey cast iron, shall be used in the jack construction.
- b. The jack unit shall consist of:
 - (1) A plunger of heavy seamless solid rod turned smooth and true to $\pm .15$ inches tolerance, and with no diameter change greater than .04 inches per foot of length. (Honed Piston)
 - (2) A stop ring electrically welded to the plunger to prevent plunger leaving its cylinder.
 - (3) Internal guide bearing.

- (4) Cylinder head with removable packing gland to facilitate replacement of packing.
- (5) Provide a counterweight platen connection designed for this particular roped application in accordance with ASME Standards.
- (6) A bleeder valve to release gases from the system.
- (7) A pressure switch in the supply-line between the cylinder and valve, which shall be activated by the loss of pressure at the top of the cylinder.

2.6.6 Work Lights and Receptacles

- a. Install a single 110 volt GFCI receptacle in the car in an inconspicuous location.
- b. Provide work lights and 110 volt GFCI receptacles at top and bottom of elevator car. Provide lights with wire guards and local switch.

2.6.7 Counterweight

- a. Provide a counterweight assembly using a structural or formed metal frame designed to hold filler weights securely in place and support piston/roping connections without distortion or strain on the guiding members and frame structure.
- b. Provide a wire rope sheave with relative mounting apparatus in accordance with ASME Standards, and properly guard the wire ropes to prevent any accidental contact or displacement of ropes.

2.7 CONTROL EQUIPMENT AND FEATURES

2.7.1 Wiring

- a. Provide all wiring and conduit required for the operation of the elevators with relative signaling and communication.
- b. Wiring, conduit and all fittings shall be in accordance with requirements of Division 16 and the governing code (New York City).
- c. Run all wiring in galvanized conduit or in metal wireways.
- d. Flexible metal conduit with ground wiring may be used for short runs from main hoistway wireway to interlocks, fixtures, limit switches and between control panels, motors and brakes per New York City Code.

- e. Provide traveling cables with polyvinyl chloride and flame resistant outer cover. Prehang the cables for at least 24 hours with ends suitably weighted to eliminate twisting during operation.
- f. Provide at least 10% spare, but not less than four (4) spare conductors, in travel cables and in all hoistway risers.
- g. Provide six (6) pairs of 18 gauge twisted and shielded cables in traveling cable for the car. Terminate them to barrier-type terminal strip behind elevator return panel at one end of cable and within a machine room security junction box at the other end.
- h. Provide a video coaxial cable, type RG59U, in traveling cable for the car. Leave 10 feet of slack in the cab ceiling space on one end and 3 feet slack in a machine room security junction box.
- i. Where the main elevator disconnect devices are not located in the machine room or they are not in the view of the pump motor, provide necessary auxiliary disconnect means to meet the requirements of the New York City Code.

2.7.2 Simplex Automatic Selective Collective Operation (New)

- a. The elevator shall automatically travel to landings for which a call demand exists. Stops in response to calls that are registered in either the car or corridor push-button stations shall occur in the natural order of progression in which the floors are encountered, depending on the direction of car travel, and irrespective of the order in which calls are registered. In responding to corridor calls, the elevator shall answer only those demands that correspond to the direction in which the car is traveling.
- b. Call acknowledgment lights provided in both the car and corridor push-button fixtures shall be extinguished as the car begins its slowdown approach to the corresponding landing. Immediately after cancellation, a corridor call shall be inoperative until the elevator doors have completed their dwell time in the open position and commenced their closing cycle.

2.7.3 Car/Landing Door Operation (New)

- a. Car and landing doors shall be arranged to operate in unison without excessive noise or slamming in either direction of travel. Door opening speeds of two (2) feet per second shall be provided in conjunction with closing speeds of 1.0 feet per second in accordance with governing code. Door operation shall be arranged to commence as the car enters its final leveling approach to a landing. In no case shall the door opening cycle conclude before the car comes to a complete stop at floor level.

- b. Door open and door close elapsed time shall be measured between the moment car door operation in either direction begins and the instant at which that particular cycle is completed.
- c. When responding to either a car or corridor call, the amount of time that the elevator door remain stationary in the open position shall be adjustable anywhere up to sixty (60) seconds. Door open dwell time for a corridor call shall be separate of that for a car call, and in both cases, dwell time shall be canceled whenever any of the infrared beams projected across the car entrance are momentarily interrupted by passenger transfers, followed by a reduced door open dwell time of approximately one (1) second (adjustable) after the beam is re-established.
- d. The operation of the door protective device by physical contact (mechanical safety-edge) or the interruption of one or more infrared light beams (dual or multi-beam non-contact) during the close cycle shall cause the immediate reversing of the doors to the full open position.
- e. The door closing cycle shall be arranged so that, in the event the door protective devices become continually obstructed after the normal door open dwell time has expired, and following a time interval of approximately thirty (30) seconds (adjustable), a warning tone shall sound and the door closing cycle shall commence at reduced speed and torque per ASME A17.1 Code requirements.
- f. The car operating station shall be provided with a "door open" push button. Pressure on the "door open" button shall cause doors in the full open position to remain so and doors engaged in the close cycle to reverse direction and assume the full open position so long as pressure remains applied to the button. The "door open" buttons shall also control the open cycle during Phase II - Emergency In-car Operation. The "door close" push button shall function on Independent Service, Attendant Service or Phase II - Emergency In-car Operation as well as during normal automatic operations.
- g. Repeated attempts by the power door operator mechanisms to open or close the door at any landing shall be monitored by the new microprocessor-control system. In the event the door should fail to cycle properly after a preset (adjustable) number of attempts, the car shall either travel to the next stop or remove itself from service, depending upon whether the malfunction is in the open or close cycle.
- h. Each landing door shall be provided with an automatic self-closing mechanism arranged so that, if for some reason the car should leave the landing while the landing door is unlocked, the closing device shall immediately close and lock the door.
- i. Car door shall be arranged so as to prevent their being manually opened from inside the car unless the elevator is positioned within a floor landing zone.

2.7.4 Fire Emergency Operation

- a. Phase I - Emergency Recall Operation shall be provided in accordance with ASME A17.1 code as modified under New York City local law Appendix "K".
- b. The car operating station shall be provided with an indicator light and warning buzzer, each of which shall become activated whenever Phase I Operation is engaged. The warning buzzer shall cease to function once the car has completed the recall sequence and is positioned at the designated recall landing. The indicator light shall remain illuminated as long as Phase I Operation is activated.
- c. A two-position key-operated switch shall be provided on the designated recall landing per local law to manually activate Phase I Operation. When activated, Phase I Operation shall be arranged so that in order to reset normal service, the car must first be returned to the designated recall landing, after which the Phase I key-switch must be turned to the 'OFF' position.
- d. Phase II - Emergency Recall In-Car Operation shall be provided in accordance with ASME A17.1 code as modified under New York City local law Appendix "K".
- e. The car operating panel shall be equipped with a three-position, key-operated switch to engage Phase II Operation subsequent to completing the Phase I recall sequence and parking at the designated recall landing.
- f. The car operating panel shall be provided with a 'CALL CANCEL' push button that functions only under Phase II Operating mode. When activated, pressing the 'CALL CANCEL' button shall cause any previously registered car calls to cancel.
- g. The car operating panel shall be engraved with required fire control identifications per New York City local law.

2.7.5 Independent Service Operation (New)

- a. The car operating station shall be equipped with a key-operated switch labeled "IND SER". When placed in the "on" position, this switch shall cause the elevator to bypass all corridor calls and to travel directly to any floor chosen by registration of a car call. During Independent Service Operation, the elevator doors shall remain open at any landing until the door close or car call registration push button, is pressed and maintained until the doors are fully closed.
- b. In case an elevator is operating on the Independent Service mode and the Fire Emergency Recall system becomes activated, following a period of approximately forty-five (45) seconds, the elevator shall automatically override Independent Service Operation and engage Phase I - Fire Emergency Recall Operation.

- c. If more than one (1) car call is registered, all registered car calls shall extinguish when the elevator stops in response to the first call.

2.7.6 Attendant Service Operation (New)

- a. The car operating station shall be equipped with a key-operated switch labeled "ATT SER". When placed in the "ON" position, this switch shall cause an audible annunciator within the car station to sound each time a corridor call is registered. This annunciator shall sound only when the car door is in the open position. The direction of travel for the car shall be chosen by pressing either the "up" or "down" push button located in the new car operating panel. The elevator car door shall not close at any floor until continuous pressure is applied to the "door close" push button located in the car operating panel. Once in motion, the elevator shall respond to both car and corridor calls in the natural order of progression in which the floors are encountered, depending on the direction of car travel, and irrespective of the order in which calls are registered. In responding to corridor calls, the elevator shall answer only those demands that correspond to the direction in which the car is traveling. Returning the attendant service key switch to the "OFF" position shall cause the elevator to resume normal automatic operation.
- b. In case the elevator is operating on the Attendant Service mode and the Fire Emergency Recall feature becomes activated, following an interval of approximately forty-five (45) seconds, the elevator shall automatically override Attendant Service Operation and revert to Phase I - Fire Emergency Recall Operation.
- c. A constant pressure push button shall be provided in the car operating panel which when pressed shall cause the elevator to by-pass hall calls registered in the system when on Attendant Service Mode. Locate this button in the locked access compartment or on the fixture cover plate as directed by the City of New York. Clearly identify the button as "Bypass" duplicating the style of engraving selected by City of New York.

2.7.7 Security Operating Control (New - Keyed Control)

- a. Provide a security car call keyed disconnect switch adjacent to each floor push button for all landings served.
- b. Arrange required keying with City of New York's Designee and master system accordingly.
- c. Override security control with fire emergency control in accordance with code and local laws.

2.7.8 Automatic Releveling

- a. Equip the elevator with a floor leveling device which shall automatically bring the car to a stop within 1/4" of floor with any floor for which a stop has been initiated, regardless of load or direction of travel. Provide an automatic releveling device which shall be arranged to automatically return the elevator to the floor in the event the elevator should creep down a predetermined distance below floor level. This device shall be operative at all floors served, whether the hoistway door or car door is open or closed, or whether the emergency stop switch has been thrown, provided there is no interruption of power to the elevator.

2.7.9 Protective Device

- a. Should a hydraulic elevator stall due to low oil condition, or the elevator fails to reach the landing in the up direction, protective device shall automatically return the elevator to the bottom landing, open the door and shut down the system.

2.7.10 Sound Reducing Protection

- a. When operating per plans and specifications, the elevator equipment shall not generate noise levels in excess of NC-35 in occupied tenant spaces and shall be free of pure tones. For the purpose of this specification, a pure tone shall be defined as a sound level in any one-third octave band which is greater than 5 dB above both adjacent one-third octave bands, in the range 45 to 11,200 Hz. Provide the following treatments as a minimum.
 - (1) Install an oil-hydraulic muffler in oil line near power unit. It shall contain pulsation absorbing material inserted in a blow-out proof housing, arranged for inspecting interior parts without removing unit from oil line. Rubber hose without blow-out proof features will not be acceptable.
 - (2) Mount vibration pads under the power unit assembly and oil line support brackets to isolate the unit from the building structure.
 - (3) Locate the power unit at least 1" from any walls.
 - (4) Provide a resilient insert of neoprene sponge at any hydraulic floor or wall supports or use neoprene mount or hanger for the support.

2.7.11 Auto Lowering

- a. Provide automatic battery powered lowering feature for the elevator. In the case of normal power outage, an emergency operation shall be activated, lowering the car to the Ground Floor landing. The doors shall open automatically to discharge passengers. The elevator shall remain parked with its doors closed and door open button operative until normal power is restored.
- b. Include two (2) gel batteries, solid-state controls, charger, monitor lights and a test button and shall be fed by a 120 volt, 20 Ampere branch or circuit from the emergency power source provided under Division 16.
 - (1) When normal power is restored, the elevator shall return to normal service only after the completion of the automatic lowering operation
 - (2) Provide a test button in the control panel to simulate this operation.

2.8 MACHINE ROOM EQUIPMENT

2.8.1 Pump Motor (40 HP)

- a. Provide a compact alternating current induction motor, designed for a minimum of 80 starts per hour, continuous rated, 50° C temperature rise.

2.8.2 Controller and Selector (G.A.L. Galaxy)

- a. The controller shall be designed for wall or free-standing mounting to give service as herein specified. The controller shall be the generic type, microprocessor or programmable controller-based unit mounted in a NEMA Type 1 enclosure. The controller shall be designed to control the starting acceleration, deceleration and stopping of the elevator and to prevent damage to the motor from overload or excessive current. A relay shall be provided, as required, designed to prevent the operation of the elevator in case of phase reversal, phase failure or low voltage in the power supply.
- b. A selector shall be provided which will perform all functions incidental to the control system which relates to the position and movement of the car in the hoistway.
- c. All controller wiring shall be neatly formed and tied. The wiring on the back of the panel shall be of the flame-resistant type. The terminals are to have suitable indelible means of identification to facilitate testing and repair. The identification markings shall be coordinated with identical markings on the wiring diagrams. All leads, except the control and signal circuits, shall be provided with either solder or solderless lugs. Control and signals wires shall be brought to accessible washer type or soldered terminals or studs.

- d. All leads, except the control and signal circuits, shall be provided with either solder or solderless lugs. Control and signal wires shall be brought to accessible washer type or solderless terminals or studs.
- e. Provide a solid-state starter for the pump motor.
- f. The elevator control system shall be provided with diagnostic capabilities for trouble-shooting and monitoring systems operation. As depicted by means of a CRT monitor, LCD display, LED indicator lights, or Field Service Tool.
- g. In the event diagnostics and monitoring is accomplished via Field Service Tools, provide the required Field Service Tools with related control system appurtenances for diagnostic evaluations, system monitoring and field adjustments.
 - (1) Instructions for proper use of such diagnostic tools and/or equipment shall be provided with all coding and other operational requirements.
 - (2) Diagnostic tools, instructions and/or other material provided shall be maintained by the installation contractor, updated and calibrated under the service agreement. Should the agreement be canceled for any reason by either party, maintenance and updating of diagnostic tools shall be provided to the City of New York at the Contractor's cost plus established profit margin, based on the mechanic's hourly wage charge. The City of New York may request field and technical instruction be provided by the original installation contractor or manufacturer for proper servicing by other qualified elevator company personnel. The established cost plus profit, as previously specified, shall be applicable for the life of the new systems provide.
- h. Microprocessor Documentation:
 - (1) Elevator Contractor shall provide and/or obtain complete information on systems' design, component parts, installation and/or modification procedures, adjusting procedures and associated computer conceptual logic circuitry and field connection.
 - (2) Provide fully detailed and annotated computer printouts of each program utilized in the project after final acceptance by City of New York and Commissioner.
 - (3) Provide microprocessor upgrading and/or modifications to programs that have been designed to enhance the operation of the equipment for a period of 10 years after project approval.

2.8.3 Power Unit

- a. Provide a self-contained power unit. It shall include: a structural steel outer base, including tank supports; a floating inner base so that there is no metallic contact for mounting the motor pump assembly; sound isolation panels to enclose the unit and reduce airborne noises.
- b. Provide a reinforced low volume oil reservoir. Included in the reservoir shall be an oil fill strainer with air filter, oil temperature gauge, oil level gauge assembly, and a self-cleaning strainer in the suction line.
- c. Design the vertical-mounted pump for oil hydraulic elevator service. It shall be of the positive displacement designed for steady discharge with minimum pulsation and will give smooth quiet operation.
- d. The oil control unit shall be of the manufacturer's own electronic-type design, but shall include relief, safety check, start and slow down valves with remote adjustment provided in conjunction with inbound telephone switching by others.
 - (1) Use lowering and leveling valves for drop away speed, lowering speed, leveling speed and stopping speed to insure smooth down starts and stops.
 - (2) Provide a valve for manual lowering of the elevator car in event of power failure and for use in servicing and adjusting the elevator mechanism.
 - (3) Design the tank shut-off valve for isolating oil in the power unit tank to ensure each of servicing and adjusting the elevator mechanism without removing oil from the tank.
 - (4) All valves shall be accessible for adjustment. All adjustment shall be made without removing the assembly from the oil line.

2.8.4 Piping

- a. Provide all necessary pipes and fittings to connect the power unit to the jack. Use minimum Schedule 80 steel pipe. A shut off valve shall be provided for maintaining and testing.

2.8.5 Mainline Strainer

- a. Provide a mainline strainer of the self-cleaning, compact type, equipped with a 40 mesh element and installed in the oil line.

2.9 FIXTURES

2.9.1 Main Car Operating Panel

- a. Provide a main car operating panel on the inside return front panel.
- b. The call buttons provided for each floor served shall cause the car to travel to the floor on momentary pressure of the call button.
- c. The call buttons shall become individually illuminated as they are pressed. The button lights shall be extinguished as the calls are answered.
- d. The panel shall include:
 - (1) A call button for each floor served (With security keyed switch)
 - (2) Door open button/door close button
 - (3) "Alarm" button
 - (4) "Emergency Stop" button (pull type)
 - (5) An auto-dial telephone complying with ADA requirements. Provide a visual "call acknowledged" indicator with an engraved "When lit help is on the way" message. The perforated hole pattern in swing front return panel shall be as approved by the Commissioner.
 - (6) The locked service cabinet shall be flush and contain the key switches required to operate and maintain the elevator, including, but not limited to:
 - (a) Light switch
 - (b) Fan switch
 - (c) 110 volt GFCI duplex receptacle

(d) Emergency light test button

- (7) Three (3) position key-operated firefighter switch, call cancel button and illuminated visual/audible signal system (override security disconnects).
 - (8) Engraved and epoxy filled elevator capacity, elevator number, "No Smoking", and warning and caution messages as required by the Code
 - (9) Inspection Certificate/Frame per New York City Standard
 - (10) Two inch (2") digital car position indicator without a separate faceplate
 - (11) Suitable space for optional security card key access.
- e. Provide concealed full height piano hinges of sufficient strength to support the operating panel, without sagging, in the open position.

2.9.2 Car and Hall Call Buttons

- a. The buttons shall become individually illuminated as they are pressed and extinguished as the calls are answered.
- (1) The call buttons shall have LED call registered lights.

2.9.3 Hall Call Stations

- a. Provide a single button at each terminal floor and double buttons at all typical floors.
- b. Include firefighter key switch and associated New York City firefighter instructions in the main lobby recall level station.
- c. Include one inch (1") digital floor indicator at all floor landings.

2.9.4 Car Riding Lantern

- a. Provide a car riding lantern with visual and audible signals in the entrance post. Mount lantern flush with hairline joints.
- b. Car lantern shall indicate the direction of car when doors are 3/4 open.
- c. The unit shall sound once for the "up" direction and twice for the "down" direction. The lantern shall have an electronic chime with adjustable sound volume.

2.9.5 Emergency Lighting Fixture

- a. Provide an emergency lighting fixture in the car operating panel without a separate faceplate. The fixture shall have a milk white plexiglass lens and a battery capacity of least four (4) hours.
- b. Provide nickel cadmium batteries and a charger and mount the power pack on top of car.
- c. Arrange for completely automatic operation when normal power is interrupted.
- d. A 6" diameter alarm bell with a sound output of between 80-90 dBa (measured from a distance of 10') shall be mounted on top of the elevator car. Activation of this bell shall be controlled by the ALARM button in the car operating station which shall illuminate when pressed.

2.9.6 Fixture Attachment, Finish and Design

- a. Graphics shall be selected by the Commissioner.
- b. Refer to drawings for other design requirements. Where no special design is shown, the faceplates shall be 1/8" thick stainless steel faceplate with tamperproof fasteners having No. 4 brushed finish.
- c. Mount fixtures with tamperproof screws. The screw and key switch cylinder finishes shall match faceplate finish.
- d. Where key-operated switch and or key operated cylinder locks are furnished in conjunction with any component of the installation, four keys for each individual switch or lock shall be furnished, stamped or permanently tagged to indicate function.
- e. All caution signs, code mandated instructions and directives shall be engraved and filled with epoxy.

2.10 PERFORMANCE AND DESIGN REQUIREMENTS

2.10.1 The elevator shall be adjusted to meet the following performance requirements:

- a. Speed: within 95 to 105% of rated speed under any loading condition.
- b. Leveling: within 1/4" under any loading condition.
- c. Door Operating Times:

<u>Opening</u>	<u>Closing</u>
2.5 seconds	3.5 seconds

Door dwell time for hall calls: 5.0 seconds

Door dwell time for car calls: 3.0 seconds

- d. Hydraulic Pressure: 800 psi maximum

2.10.2 Maintain the following ride quality requirements for the elevator:

- a. Noise levels inside the car shall not exceed the following:
 - (1) Car at rest with doors closed and fan off -40 dba.
 - (2) Car at rest with doors closed, fan running -55 dba.
 - (3) Car running at high speed, fan off - 50 dba.
 - (4) Door in operation - 60 dba.
- b. Amplitude of acceleration and deceleration shall not exceed 2.0 feet per second, per second. A sustained jerk shall not be more than twice the acceleration.

2.11 SPECIAL REQUIREMENTS

2.11.1 Handicap Requirements

- a. Locate the alarm button and emergency stop switch at 35 inches, and floor and control button not more than 48 inches.
- b. Provide raised markings in the panel to the left of the floor and control buttons. Letters and numbers shall be a minimum of 5/8 inch and raised .03 inch and shall be in contrasting color to the call buttons. Plates, if used, shall be stud mounted and recessed flush with the car station.
- c. The centerline of the hall pushbutton station shall be 42" above the floor.
- d. The cab lantern shall sound once for the "up" direction and twice for the "down" direction.
- e. Provide floor designations at each entrance on both sides of jamb at a height of 60" above the floor. Designations shall be 2" high, raised .03 inches and shall be selected by the Commissioner.
- f. Provide an audible signal to tell passenger that the car is stopping or passing a floor served by the elevator.

2.11.2 Elevator Safety Requirements for Seismic Zone 2

- a. Guide rails, guide rail supports and their fastenings shall meet the requirements for Zone 2 in existing building structures.

- b. Provide a safety valve in the oil supply line as close as possible to the cylinders to stop and hold the elevator with rated load when the oil flow rate exceeds the oil flow rate required for the operating speed in the "down" direction, but before it reaches 125% of the down speed oil flow rate.
- c. Equip the pump unit with required supports to prevent displacement.

2.11.3 Parking

- a. When the elevator parks in its zone with the doors closed, after an adjustable time period (0-5 minutes with 15.0 second increments), the car lights and fan shall be automatically turned off. When a hall call is assigned to the elevator, its lights and fan shall be automatically re-activated.

2.12 COMMUNICATION SYSTEM

2.12.1 Auto Dial Telephone

- a. Provide an automatic dialing, hands-free telephone in the car station. The system shall be in compliance with ADA requirements.
- b. The telephone shall be turned on by pressing the emergency alarm switch in the car panel. It shall automatically dial a programmed number to alert the security personnel that there is a problem in the elevator.
- c. Provide a programmable time clock switch mechanism which shall allow the system to dial a second programmed number for after hours and weekends.
- d. The system shall have a ring-back feature to allow calls to be placed to the elevator. It shall answer the incoming call automatically and shut off after an adjustable programmed time.
- e. Provide an audible and visual signal to indicate that a communication link has been established. Provide a circular drill hole pattern in car operating panel faceplate located above the floor buttons.
- f. Ni Cad batteries shall ensure operation under all conditions.
- g. Provide an automatic dialing, hands-free telephone in the machine room for the purpose of establishing communication between the machine room and the elevator. The unit shall include a separate enclosure and faceplate and be able to withstand the ambient conditions typically found in machine rooms.
- h. All connections from the junction box to the telephone system shall be done by the Elevator Contractor. Any required new telephone lines shall be provided and interfaced by others.

- i. The entire system shall be designed and located in accordance with ADA Standards to include visible call acknowledging, engraved advisories, etc.
- j. Install the instrument in the elevator and wiring within the hoistway, terminating the wiring in the elevator machine room. A suitable and identified junction box in the machine room shall be installed.

2.13 CAR ENCLOSURE

2.13.1 Elevator Cab (New)

a. Car Shell and Panels

- (1) The car sides and rear wall shall be constructed of No. 14 gauge furniture steel. Apply sound deadening material to the outside face of the shell. Sound deadening material shall be of the rubberized type and shall be of either brush or spray-on consistency. Material shall be applied to a minimum of 1/8" thickness.
- (2) The car top shall be of no less than No. 12 gauge sheet steel suitably braced to meet the requirements of the A17.1 Code. Exit shall include hinging and locking arrangements of top emergency door with electrical safety switch to prevent operation with door open.
- (3) The transom, front return, entrance frame and doors shall be constructed of 14 gauge metal finished No. 4 brushed stainless steel.

- (4) The wall panels shall be constructed of 1/2" thick marine grade plywood, covered in rigidized stainless steel as selected by Commissioner. Each panel section shall be trimmed with stainless steel moldings and separation strips.
 - (5) Apply furniture steel or suitable laminate to shaft side of panels to prevent warping or other deformations.
- b. Base/Flooring:
 - (1) Provide a finished stainless steel metal base with a 1/4" wide continuous vent slot above the base to allow the proper amount of air to infiltrate the cab based on the CFM of the exhaust fan and car interior size.
 - (2) Prepare base to accept finished floor using rubber tile as specified in finish schedule.
- c. Entrance Sill:
 - (1) Provide car door entrance saddle using an extruded aluminum sill.
- d. Lighting/Ceiling:
 - (1) Provide high efficiency tamper-proof fluorescent light fixtures with finished stainless steel No. 4 metal panels.
- e. Flooring:
 - (1) Provide finish floor covering using rubber tile as specified in finish schedule.
- f. Handrail:
 - (1) Provide standard 1/2" x 2" stainless steel flat-stock handrail on rear and side walls with top of rails located 32 inches above the finished floor. Use three (3) points of attachment designed for interior access servicing with exterior support plates.
- g. Protection Pads:
 - (1) Provide floor-to-ceiling vinyl pads for all wall surfaces with associated hanging hardware.

2.13.2 FABRICATION AND INSTALLATION

- a. Maintain accurate relation of planes and angles with hairline fit of contacting panels and/or surfaces.

- b. Any shadow gaps (reveals) between panels shall be consistent and uniform.
- c. Unless otherwise specified or shown on the drawings, for work exposed to view use concealed fasteners.
- d. Maximum exposed edge radius at corner bends shall be 1/16". There shall be no visible grain difference at the bends.
- e. Form the work to the required shapes and sizes with smooth and even curves, lines and angles. Provide necessary brackets, spacers and blocking material for assembly of the cab.
- f. Interior cab surfaces shall be flat and free of bow or oil canning. The maximum overall deviation between the low and high points of 24" by 24" panel section shall not exceed 1/32".
- g. Make weights of connections and accessories adequate to safely sustain and withstand stresses to which they will be subjected.
- h. All steel work except stainless steel materials shall be painted with an approved coat of primer and one (1) coat of baked enamel paint.

PART 3 - EXECUTION

3.1 INSPECTION

- 3.1.1 Study the Contract Documents with regard to the work as shown and required so as to ensure its completeness.
- 3.1.2 Examine surface and conditions to which this work is to be attached or applied, and notify the Commissioner in writing, if conditions or surfaces are detrimental to the proper and expeditious installation of the work. Starting the work shall imply acceptance of the surfaces and conditions to perform the work as specified.
- 3.1.3 Verify, by measurements at the job site, dimensions affecting the work. Bring field dimensions which are at variance with those on the accepted shop drawings to the attention of the Commissioner. Obtain the decision regarding corrective measures before the start of fabrication of items affected.
- 3.1.4 Cooperate in the coordination and scheduling of the work of this section with the work of other sections so as not to delay job progress.

3.2 INSTALLATION

- 3.2.1 Provide a detailed project implementation plan with coordination requirements and relative schedules within two (2) weeks of contract award.

- 3.2.2 Installation of barricades and required protection to secure the hoistway and relative work areas.
- 3.2.3 Install the elevator, using skilled personnel, in strict accordance with the final accepted shop drawings and other submittals.
- 3.2.4 Comply with the code, manufacturer's instructions and recommendations.
- 3.2.5 Coordinate work with the work of other trades for proper time and sequence to avoid construction delays and to insure right-of-way of system. Use lines and levels to ensure dimensional coordination of the work.
- 3.2.6 Accurately and rigidly secure supporting elements within the shaftway to the encountered construction within the tolerance established.
- 3.2.7 Erect guide rails plumb and parallel with a tolerance of 1/8" (plus or minus 1/16").
- 3.2.8 Install rails so that joints do not interfere with brackets.
- 3.2.9 Set entrance plumb in hoistway and in alignment with new guide rails.
- 3.2.10 Arrange door tracks and sheaves so that no metal to metal contact exists.
- 3.2.11 Reinforce hoistway fascias to allow not more than 1/2 inch of deflection.
- 3.2.12 Pack openings around oil line with fire resistant, sound isolating glass or mineral wool.
- 3.2.13 Install elevator cab enclosure on platform plumb and align cab entrance with hoistway entrances.
- 3.2.14 Sound isolate cab enclosure from car structure. Allow no direct rigid connections between enclosure and car structure and between platform and car structure.
- 3.2.15 Isolate cab fan from canopy to minimize vibration and noise.
- 3.2.16 Remove oil, dirt and impurities and give a factory coat of rust inhibitive paint to all exposed surfaces of struts, hanger supports, covers, fascias, toe guards, dust covers and other ferrous metal.
- 3.2.17 Prehang traveling cables for a least 24 hours with ends suitably weighted to eliminate twisting.
- 3.2.18 Provide isolation pad between platen head and counterweight assembly.
- 3.2.19 Sound isolate pump unit and controller from building structure.

- 3.2.20 Mount operating fixtures with concealed fasteners. Coordinate fixture material and finishes with the Commissioner.
- 3.2.21 Adjust the elevator to meet the performance requirements.
- 3.2.22 Provide and install motors, switches, controls, safety and maintenance and operating devices in strict accordance with the submitted wiring diagrams and applicable codes and regulations having jurisdiction.
- 3.2.23 Protect finished surfaces at all times during delivery, storage and installation. After installation touch up, in the field, surfaces of shop primed elements which have become scratched or damaged.
- 3.2.24 Lubricate operating parts of system as recommended by the manufacturer.
- 3.2.25 Provide marking and data plates in accordance with ASME 2000/2003 Standards applicable. (Part 8)
- 3.2.26 Perform mandated acceptance inspection/testing and obtain governing authority approval with new Certificate of Operation.

3.3 PROTECTION AND CLEANING

- 3.3.1 Adequately protect surfaces against accumulation of paint, mortar, mastic and disfiguration or discoloration and damage during shipment and installation.
- 3.3.2 Upon completion, remove protection and thoroughly clean work and have it free from discoloration, scratches, dents and other surface defects.
- 3.3.3 The finished installation shall be free of defects. Before final completion and acceptance of the building, repair and/or replace defective work, to the satisfaction of the Commissioner and the City of New York at no additional cost.

END OF SECTION 142120

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 2105 00

COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.
- C. Division 1, Section 018113.3 – Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings.
- D. Division 1, Section 018113 – Sustainable Design Requirements (LEED Building)
- E. Division 1, Section 017419 - Construction Waste Management and Disposal
- F. Division 1, Section 018119 - Construction IAQ Requirements

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Piping materials and installation instructions common to most piping systems.
 - 2. Mechanical sleeve seals.
 - 3. Sleeves.
 - 4. Escutcheons.
 - 5. Grout.
 - 6. Painting and finishing.
 - 7. Supports and anchorages.

1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspace, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.

D. The following are industry abbreviations for rubber materials:

1. EPDM: Ethylene-propylene-diene terpolymer rubber.
2. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Mechanical sleeve seals.
2. Escutcheons.

B. Welding certificates.

C. LEED BUILDING SUBMITTAL REQUIREMENTS:

1. Provide for all field-applied adhesives, sealants (used as fillers), and paints: Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, paints and coatings applied on the interior of the building. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

1.5 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. LEED BUILDING REQUIREMENTS

1. GENERAL REQUIREMENTS: The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.
2. PERFORMANCE CRITERIA: All field applied adhesives, sealants (used as fillers), prime painting, and finished painting shall comply with the low VOC requirements called out in Division 1, Section 018113.3 - Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, & Architectural Coatings, and Section 09900 - Interior Paint.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes 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.

1.7 COORDINATION

- A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for fire-suppression installations.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- C. Coordinate requirements for access panels and doors for fire-suppression items requiring access that are concealed behind finished surfaces.

1.8 WORK INCLUDED

- A. Related Work and Requirements Include:
 - 1. Requirements of Construction Waste Management, Section 017419.
 - a. The Commissioner has established that as many of the surplus and waste material as economically feasible shall be reused, salvaged, or recycled. To that end, the Contractor for Electrical Work shall participate in the development of the Waste Management Plan, and collect, sort and deposit in designated containers, their waste, non-returned surplus materials and rubbish in accordance with the approved Plan.
 - b. Project Diversion Goals are stated in Section 017419 – Construction Waste Management. The Contractor for Electrical Work shall meet or exceed the minimum percentage of waste stated there for diversion from landfill, unless the Contractor for General Construction Work designates a different amount. Specific items/categories shall be in accordance with the Documents and as established in the Plan.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified, or approved equal.

2.2 PIPE, TUBE, AND FITTINGS

- A. Refer to individual piping Sections for pipe, tube, and fitting materials and joining methods.
- B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

- A. Refer to individual piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - 1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 - 2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

2.4 MECHANICAL SLEEVE SEALS

- A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
 - 1. Manufacturers:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Pipeline Seal and Insulator, Inc.
 - 2. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 3. Pressure Plates: Carbon steel. Include two for each sealing element.
 - 4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.5 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

2.6 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: With set screw. Polished chrome-plated.
- D. One-Piece, Stamped-Steel Type: With set screw and chrome-plated finish.
- E. One-Piece, Floor-Plate Type: Cast-iron floor plate.

2.7 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 - 1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.
 - 3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Sections specifying piping systems.
- B. 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 Coordination Drawings.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
- 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 otherwise.
- 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. Select system components with pressure rating equal to or greater than system operating pressure.
- L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
 - 1. New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
 - c. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type and set screw.
 - d. Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type with concealed hinge and set screw.
 - e. Bare Piping in Equipment Rooms: One-piece, stamped-steel type with set screw.
 - f. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.
- M. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 - 3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. Steel Pipe Sleeves: For pipes smaller than NPS 6.
 - b. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level.
 - 1) Seal space outside of sleeve fittings with grout.
 - 4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint.

- N. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Install steel pipe for sleeves smaller than 6 inches in diameter.
 2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
 3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- O. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- P. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials.

3.2 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. 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 unless dry seal threading is specified.
 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- E. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.3 PAINTING

- A. Painting of fire-suppression systems, equipment, and components.
- B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.4 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor fire-suppression materials and equipment.
- B. Field Welding: Comply with AWS D1.1.

3.5 GROUTING

- A. Clean surfaces that will come into contact with grout.
- B. Provide forms as required for placement of grout.
- C. Avoid air entrapment during placement of grout.
- D. Place grout around anchors.
- E. Cure placed grout.

3.6 WASTE MANAGEMENT AND DISPOSAL

- A. Comply with the requirements established by the Contractor for General Construction Work to separate and recycle, salvage or reuse cast-offs, surplus and waste material in accordance with the Waste Management Plan.
- B. Arrange for suppliers to take back shipping and packing materials for reuse or recycling to the maximum extent economically feasible, or include them in the Waste Management Plan.

END OF SECTION 21 05 00

SECTION 210548

VIBRATION AND SEISMIC CONTROLS FOR FIRE PROTECTION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Isolation pads.
 - 2. Restrained elastomeric isolation mounts.
 - 3. Restrained spring isolators.
 - 4. Spring hangers with vertical-limit stops.
 - 5. Pipe riser resilient supports.
 - 6. Resilient pipe guides.
 - 7. Restrained vibration isolation roof-curb rails.
 - 8. Seismic snubbers.
 - 9. Restraining braces and cables.
 - 10. Steel vibration isolation equipment bases.

1.3 DEFINITIONS

- A. IBC: International Building Code.
- B. ICC-ES: ICC-Evaluation Service.
- C. OSHPD: Office of Statewide Health Planning and Development for the State of California.

1.4 PERFORMANCE REQUIREMENTS

- A. Wind-Restraint Loading:
 - 1. Basic Wind Speed: 15 mph.

2. Minimum 10 lb/sq. ft. (48.8 kg/sq. m) multiplied by the maximum area of the HVAC component projected on a vertical plane that is normal to the wind direction, and 45 degrees either side of normal.

B. Seismic-Restraint Loading:

1. Site Class as Defined in the IBC.
2. Assigned Seismic Use Group or Building Category as Defined in the IBC.

1.5 SUBMITTALS

A. Product Data: For the following:

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 seismic-restraint component used.
 - a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an agency acceptable to authorities having jurisdiction.
 - b. Annotate to indicate application of each product submitted and compliance with requirements.
3. Interlocking Snubbers: Include ratings for horizontal, vertical, and combined loads.

B. Delegated-Design Submittal: For vibration isolation and seismic-restraint details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer licensed in the State of New York responsible for their preparation.

1. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, seismic and wind forces required to select vibration isolators, seismic and wind restraints, and for designing vibration isolation bases.
 - a. Coordinate design calculations with wind load calculations required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.
2. Riser Supports: Include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on building structure, spring deflection changes, and seismic loads. Include certification that riser system has been examined for excessive stress and that none will exist.
3. Vibration Isolation Base Details: Detail overall dimensions, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, base weights, equipment static loads, power transmission, component misalignment, and cantilever loads.

4. Seismic and Wind-Restraint Details:

- a. Design Analysis: To support selection and arrangement of seismic and wind restraints. Include calculations of combined tensile and shear loads.
 - b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the 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 and vibration isolation details with wind-restraint details required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.
 - d. Preapproval and Evaluation Documentation: By an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).
- C. Coordination Drawings: Show coordination of seismic bracing for HVAC piping and equipment with other systems and equipment in the vicinity, including other supports and seismic restraints.
- D. Welding certificates.
- E. Qualification Data: For professional engineer licensed in the State of New York and testing agency.
- F. Field quality-control test reports.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
- B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
- C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- D. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer licensed in the State of New York.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
1. Ace Mountings Co., Inc.
 2. Amber/Booth Company, Inc.
 3. California Dynamics Corporation.
 4. Isolation Technology, Inc.
 5. Kinetics Noise Control.
 6. Mason Industries.
 7. Vibration Eliminator Co., Inc.
 8. Vibration Isolation.
 9. Vibration Mountings & Controls, Inc.
- B. Pads: Arranged in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.
1. Resilient Material: Oil- and water-resistant neoprene.
- C. Restrained Mounts: All-directional mountings with seismic restraint.
1. Materials: Cast-ductile-iron or welded steel housing containing two separate and opposing, oil-resistant rubber or neoprene elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
 2. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.
- D. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic or limit-stop restraint.
1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to weight being removed; factory-drilled baseplate bonded to 1/4-inch- (6-mm-) thick, neoprene or rubber isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
 2. Restraint: Seismic or limit stop as required for equipment and authorities having jurisdiction.
 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.

- E. Spring Hangers with Vertical-Limit Stop: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression and with a vertical-limit stop.
1. 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.
 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. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
 7. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
 8. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.
- F. Pipe Riser Resilient Support: All-directional, acoustical pipe anchor consisting of 2 steel tubes separated by a minimum of 1/2-inch- (13-mm-) thick neoprene. Include steel and neoprene vertical-limit stops arranged to prevent vertical travel in both directions. Design support for a maximum load on the isolation material of 500 psig (3.45 MPa) and for equal resistance in all directions.
- G. Resilient Pipe Guides: Telescopic arrangement of 2 steel tubes or post and sleeve arrangement separated by a minimum of 1/2-inch- (13-mm-) thick neoprene. Where clearances are not readily visible, a factory-set guide height with a shear pin to allow vertical motion due to pipe expansion and contraction shall be fitted. Shear pin shall be removable and reinsertable to allow for selection of pipe movement. Guides shall be capable of motion to meet location requirements.

2.2 RESTRAINED VIBRATION ISOLATION ROOF-CURB RAILS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
1. Amber/Booth Company, Inc.
 2. California Dynamics Corporation.
 3. Isolation Technology, Inc.
 4. Kinetics Noise Control.
 5. Mason Industries.
 6. Thybar Corporation.
 7. Vibration Eliminator Co., Inc.
 8. Vibration Isolation.
 9. Vibration Mountings & Controls, Inc.

- B. General Requirements for Restrained Vibration Isolation Roof-Curb Rails: Factory-assembled, fully enclosed, insulated, air- and watertight curb rail designed to resiliently support equipment and to withstand seismic and wind forces.
- C. Lower Support Assembly: Formed sheet-metal section containing adjustable and removable steel springs that support upper frame. Upper frame shall provide continuous support for equipment and shall be captive to resiliently resist seismic and wind forces. Lower support assembly shall have a means for attaching to building structure and a wood nailer for attaching roof materials, and shall be insulated with a minimum of 2 inches (50 mm) of rigid, glass-fiber insulation on inside of assembly.
- D. Spring Isolators: Adjustable, restrained spring isolators shall be mounted on 1/4-inch- (6-mm-) thick, elastomeric vibration isolation pads and shall have access ports, for level adjustment, with removable waterproof covers at all isolator locations. Isolators shall be located so they are accessible for adjustment at any time during the life of the installation without interfering with the integrity of the roof.
 - 1. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic or wind restraint.
 - a. Housing: Steel with resilient vertical-limit stops and adjustable equipment mounting and leveling bolt.
 - b. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - c. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - d. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - e. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 - 2. Pads: Arranged in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.
 - a. Resilient Material: Oil- and water-resistant standard neoprene.
- E. Snubber Bushings: All-directional, elastomeric snubber bushings at least 1/4 inch (6 mm) thick.
- F. Water Seal: Galvanized sheet metal with EPDM seals at corners, attached to upper support frame, extending down past wood nailer of lower support assembly, and counterflashed over roof materials.

2.3 VIBRATION ISOLATION EQUIPMENT BASES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - 1. Amber/Booth Company, Inc.

2. California Dynamics Corporation.
3. Isolation Technology, Inc.
4. Kinetics Noise Control.
5. Mason Industries.
6. Vibration Eliminator Co., Inc.
7. Vibration Isolation.
8. Vibration Mountings & Controls, Inc.

B. Steel Base: Factory-fabricated, welded, structural-steel bases and rails.

1. Design Requirements: Lowest possible mounting height with not less than 1-inch (25-mm) clearance above the floor. Include equipment anchor bolts and auxiliary motor slide bases or rails.
 - a. Include supports for suction and discharge elbows for pumps.
2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Bases shall 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.

2.4 SEISMIC-RESTRAINT DEVICES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
1. Amber/Booth Company, Inc.
 2. California Dynamics Corporation.
 3. Cooper B-Line, Inc.; a division of Cooper Industries.
 4. Hilti, Inc.
 5. Kinetics Noise Control.
 6. Loos & Co.; Cableware Division.
 7. Mason Industries.
 8. TOLCO Incorporated; a brand of NIBCO INC.
 9. Unistrut; Tyco International, Ltd.
- B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to authorities having jurisdiction.
1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.
- C. Snubbers: Factory fabricated using welded structural-steel shapes and plates, anchor bolts, and replaceable resilient isolation washers and bushings.

1. Anchor bolts for attaching to concrete shall be seismic-rated, drill-in, and stud-wedge or female-wedge type.
 2. Resilient Isolation Washers and Bushings: Oil- and water-resistant neoprene.
 3. Maximum 1/4-inch (6-mm) air gap, and minimum 1/4-inch- (6-mm-) thick resilient cushion.
- D. Restraint Cables: ASTM A 603 galvanized-steel cables with end connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement.
- E. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod.
- F. 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.
- G. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.
- H. Mechanical Anchor Bolts: 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 required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.

2.5 FACTORY FINISHES

- A. Finish: Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.
1. Powder coating on springs and housings.
 2. All hardware shall be galvanized. Hot-dip galvanize metal components for exterior use.
 3. Baked enamel or powder coat for metal components on isolators for interior use.
 4. Color-code or otherwise mark vibration isolation and seismic- and wind-control devices to indicate capacity range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and equipment to receive vibration isolation and seismic- and wind-control devices for compliance with requirements for installation tolerances and other conditions affecting performance.
- 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.

3.2 APPLICATIONS

- A. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.
- B. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.3 VIBRATION-CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

- A. Comply with requirements in Section "Roof Accessories" for installation of roof curbs, equipment supports, and roof penetrations.
- B. Vibration isolation used for mechanical equipment shall comply with the requirements of the New York City Building Code, and shall be mounted on vibration isolators. All air handlers located above the lowest floor shall be provided with neoprene pads between the bottom rail and the housekeeping pad.
- C. Equipment Restraints:
 - 1. Install seismic snubbers on HVAC 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 (3.2 mm).
 - 3. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.
- D. Piping Restraints:
 - 1. Comply with requirements in MSS SP-127.
 - 2. Space lateral supports a maximum of 40 feet (12 m) o.c., and longitudinal supports a maximum of 80 feet (24 m) o.c.
 - 3. Brace a change of direction longer than 12 feet (3.7 m).
- E. Install cables so they do not bend across edges of adjacent equipment or building structure.
- F. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.
- G. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.

- H. 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.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
 2. Schedule test with City of New York, through 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 least 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.
 9. Air-Mounting System Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 10. Air-Mounting System Operational Test: Test the compressed-air leveling system.
 11. Test and adjust air-mounting system controls and safeties.
 12. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.
- D. Remove and replace malfunctioning units and retest as specified above.
- E. Prepare test and inspection reports.

3.5 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

- A. Install flexible connections in piping where they cross seismic joints, 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 "Hydronic Piping" for piping flexible connections. Retain one of first two paragraphs below to identify who shall perform tests and inspections. If retaining second option in first paragraph, or if retaining second paragraph, retain "Field quality-control test reports" Paragraph in "Submittals" Article.

3.6 ADJUSTING

- A. Adjust isolators after piping 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.
- C. Adjust active height of spring isolators.
- D. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION 23 05 48

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 211100

FACILITY FIRE-SUPPRESSION WATER-SERVICE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. Section includes fire-suppression water-service piping and related components outside the building and service entrance piping through wall into the building.
- B. Utility-furnished products include water meters that will be furnished to the site, ready for installation.
- C. Related Sections:
 - 1. Division 21 Section "Wet-Pipe Sprinkler Systems" for wet-pipe fire-suppression sprinkler systems inside the building.

1.3 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. Wiring Diagrams: For power, signal, and control wiring.
- C. Coordination Drawings: For piping and specialties including relation to other services in same area, drawn to scale. Show piping and specialty sizes and valves, meter and specialty locations, and elevations.
- D. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
2. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.

B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

C. Comply with the "Approval Guide," published by FM Global, or UL's "Fire Protection Equipment Directory" for fire-service-main products.

D. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-suppression water-service piping.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:

1. Ensure that valves are dry and internally protected against rust and corrosion.
2. Protect valves against damage to threaded ends and flange faces.
3. Set valves in best position for handling. Set valves closed to prevent rattling.

B. During Storage: Use precautions for valves, including 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 valves and fire hydrants if size requires handling by crane or lift. Rig valves 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.

1.6 PROJECT CONDITIONS

- A. Interruption of Existing Fire-Suppression Water-Service Piping: 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 water-distribution service according to 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.

1.7 COORDINATION

- A. Coordinate connection to water main with utility company.

PART 2 - PRODUCTS

2.1 DUCTILE-IRON PIPE AND FITTINGS

- A. Grooved-Joint, Ductile-Iron Pipe: AWWA C151, with cut, rounded-grooved ends.
- B. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end.
- C. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end.
- D. Grooved-End, Ductile-Iron Pipe Appurtenances:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
 - a. Anvil International, Inc.
 - b. Shurjoint Piping Products.
 - c. Star Pipe Products.
 - d. Victaulic Company.
 - 2. Grooved-End, Ductile-Iron Fittings: ASTM A 47/A 47M, malleable-iron castings or ASTM A 536, ductile-iron castings with dimensions matching pipe.
 - 3. Grooved-End, Ductile-Iron-Piping Couplings: AWWA C606, for ductile-iron-pipe dimensions. Include ferrous housing sections, gasket suitable for water, and bolts and nuts.
- E. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.

1. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

F. Push-on-Joint, Ductile-Iron Fittings: AWWA C153, ductile-iron compact pattern.

1. Gaskets: AWWA C111, rubber.

G. Flanges: ASME B16.1, Class 125, cast iron.

2.2 SPECIAL PIPE FITTINGS

A. Ductile-Iron Flexible Expansion Joints:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
 - a. EBAA Iron, Inc.
 - b. ROMAC Industries Inc.
 - c. Star Pipe Products.
2. Description: Compound, ductile-iron fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include two gasketed ball-joint sections and one or more gasketed sleeve sections. Assemble components for offset and expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.
3. Pressure Rating: 250 psig minimum.

B. Ductile-Iron Deflection Fittings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
 - a. EBAA Iron, Inc.
 - b. Smith-Blair, Inc.; a Sensus company.
 - c. Viking Johnson.
2. Description: Compound, ductile-iron coupling fitting with sleeve and one or two flexing sections for up to 15-degree deflection, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.
3. Pressure Rating: 250 psig minimum.

2.3 PIPING SPECIALTIES

- A. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

B. Tubular-Sleeve Pipe Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
 - a. Cascade Waterworks Manufacturing.
 - b. Dresser, Inc.; Dresser Piping Specialties.
 - c. Ford Meter Box Company, Inc. (The); Pipe Products Division.
 - d. JCM Industries.
 - e. ROMAC Industries Inc.
 - f. Smith-Blair, Inc.; a Sensus company.
 - g. Viking Johnson.
2. Description: Metal, bolted, sleeve-type, reducing or transition coupling, with center sleeve, gaskets, end rings, and bolt fasteners, and with ends of same sizes as piping to be joined.
3. Standard: AWWA C219.
4. Center-Sleeve Material: Carbon steel.
5. Gasket Material: Natural or synthetic rubber.
6. Pressure Rating: 150 psig minimum.
7. Metal Component Finish: Corrosion-resistant coating or material.

2.4 CURB VALVES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
 1. Amcast Industrial Corporation.
 2. Ford Meter Box Company, Inc. (The); Pipe Products Division.
 3. Jones, James Company.
 4. Master Meter, Inc.
 5. McDonald, A. Y. Mfg. Co.
 6. Mueller Co.; Water Products Division.
 7. Red Hed Manufacturing & Supply.
- B. Curb Valves: Comply with AWWA C800 for high-pressure service-line valves. Valve has bronze body, ground-key plug or ball, wide tee head, and inlet and outlet matching service piping material.
- C. Service Boxes for Curb Valves: Similar to AWWA M44 requirements for cast-iron valve boxes. Include cast-iron telescoping top section of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over curb valve and with a barrel approximately 3 inches in diameter.
 1. Shutoff Rods: Steel; with tee-handle with one pointed end, stem of length to operate deepest buried valve, and slotted end matching curb valve.

- D. Meter Valves: Comply with AWWA C800 for high-pressure service-line valves. Include angle- or straight-through-pattern bronze body, ground-key plug or ball, and wide tee head, with inlet and outlet matching service piping material.

2.5 WATER METERS

- A. Water meters will be furnished by utility company.

2.6 BACKFLOW PREVENTERS

- A. Reduced-Pressure-Detector, Fire-Protection Backflow Preventer Assemblies:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
 - a. Ames Fire & Waterworks; a division of Watts Water Technologies, Inc.
 - b. Conbraco Industries, Inc.; Apollo Valves.
 - c. FEBCO; SPX Valves & Controls.
 - d. Watts Water Technologies, Inc.
 - e. Zurn Plumbing Products Group; Wilkins Water Control Products Division.
- 3. Standards: ASSE 1047 and UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
- 4. Operation: Continuous-pressure applications.
- 5. Pressure Loss: 12 psig maximum, through middle one-third of flow range.
- 10. Body Material: Cast iron with interior lining complying with AWWA C550 or that is FDA approved.
- 11. End Connections: Flanged.
- 12. Configuration: Designed for [horizontal, straight through flow.
- 13. Accessories:
 - a. Valves: UL 262, "Approval Guide," published by FM Global, listing; OS&Y gate type with flanged ends on inlet and outlet.
 - b. Air-Gap Fitting: ASME A112.1.2, matching backflow preventer connection.
 - c. Bypass: With displacement-type water meter, shutoff valves, and reduced-pressure backflow preventer.

- B. Backflow Preventer Test Kits:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
 - a. Conbraco Industries, Inc.; Apollo Valves.
 - b. FEBCO; SPX Valves & Controls.
 - c. Flomatic Corporation.
 - d. Watts Water Technologies, Inc.
 - e. Zurn Plumbing Products Group; Wilkins Water Control Products Division.

2. Description: Factory calibrated, with gages, fittings, hoses, and carrying case with test-procedure instructions.

2.7 FIRE-DEPARTMENT CONNECTIONS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
 1. Elkhart Brass Mfg. Company, Inc.
 2. Fire-End & Croker Corporation.
 3. Guardian Fire Equipment, Inc.
 4. Kidde Fire Fighting.
 5. Potter Roemer.
 6. Reliable Automatic Sprinkler Co., Inc.
- B. Description: Freestanding, with cast-bronze body, thread inlets according to NFPA 1963 and matching local fire-department hose threads, and threaded bottom outlet. Include lugged caps, gaskets, and chains; lugged swivel connection and drop clapper for each hose-connection inlet; 18-inch- high brass sleeve; and round escutcheon plate.
- C. Standard: UL 405.
- D. Connections: Two NPS 2-1/2 inlets and one NPS 4 outlet.
- E. Inlet Alignment: Square.
- F. Finish Including Sleeve: Polished bronze.
- G. Escutcheon Plate Marking: "AUTO SPKR."

2.8 ALARM DEVICES

- A. General: UL 753 and "Approval Guide," published by FM Global, listing, of types and sizes to mate and match piping and equipment.
- B. Water-Flow Indicators: Vane-type water-flow detector, rated for 250-psig working pressure; designed for horizontal or vertical installation; with two single-pole, double-throw circuit switches to provide isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal when cover is removed.
- C. Supervisory Switches: Single pole, double throw; designed to signal valve in other than fully open position.
- D. Pressure Switches: Single pole, double throw; designed to signal increase in pressure.

2.9 SLEEVES

- A. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, standard-weight, zinc-coated, plain ends.

2.10 SLEEVE SEALS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
 - 1. Advance Products & Systems, Inc.
 - 2. Calpico, Inc.
 - 3. Metraflex, Inc.
 - 4. Pipeline Seal and Insulator, Inc.
- B. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
- C. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
- D. Pressure Plates: Carbon steel.
- E. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements.

2.11 GROUT

- A. Standard: ASTM C 1107, Grade B, posthardening and volume adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Nonshrink; recommended for interior and exterior applications.
- C. Design Mix: 5000-psi, 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

- A. Water-Main Connection: Arrange with water utility company for tap of size and in location indicated in water main.

- B. Make connections with drilling machine according to the following:
 - 1. Install service-saddle assemblies and corporation valves in size, quantity, and arrangement required by utility company's 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.
- C. Comply with NFPA 24 for fire-service-main piping materials and installation.
- D. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.
 - 1. Install encasement for piping according to ASTM A 674 or AWWA C105.
- E. Bury piping with depth of cover over top at least 48 inches, below grade, and according to the following:
 - 1. In Loose Gravelly Soil and Rock: With at least 12 inches of additional cover.
- F. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.
- G. Extend fire-suppression water-service piping and connect to water-supply source and building fire-suppression water-service piping systems at locations and pipe sizes indicated.
 - 1. Terminate fire-suppression 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's fire-suppression water-service piping systems when those systems are installed.
- H. 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.
- I. Comply with requirements in Division 21 Sections for fire-suppression-water piping inside the building.
- J. Comply with requirements in Division 22 Section "Domestic Water Piping" for potable-water piping inside the building.

3.2 JOINT CONSTRUCTION

- A. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure rating same as or higher than systems pressure rating for aboveground applications unless otherwise indicated.
- B. Install unions adjacent to each valve in tubing NPS 2 and smaller.
- C. Install flanges, flange adaptors, or couplings for grooved-end piping on valves, apparatus, and equipment having NPS 2-1/2 and larger end connections.
- D. Ream ends of tubes and remove burrs.
- E. Remove scale, slag, dirt, and debris from outside and inside of pipes, tubes, and fittings before assembly.
- F. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
- G. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with grooved-end, ductile-iron-piping couplings, gaskets, lubricant, and bolts.
- H. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with bolts according to ASME B31.9.
- I. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure.
- J. Do not use flanges or unions for underground piping.

3.3 VALVE INSTALLATION

- A. Curb Valves: Install each underground curb valve with head pointed up and with service box.

3.4 DETECTOR CHECK VALVE INSTALLATION

- A. Install in vault or aboveground.
- B. Install for proper direction of flow. Install bypass with water meter, gate valves on each side of meter, and check valve downstream from meter.
- C. Support detector check valves and piping on concrete piers.

3.5 WATER METER INSTALLATION

- A. Install water meters, piping, and specialties according to utility company's written instructions.

3.6 ROUGHING-IN FOR WATER METERS

- A. Rough-in piping and specialties for water meter installation according to utility company's written instructions.

3.7 BACKFLOW PREVENTER INSTALLATION

- A. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.
- B. Do not install backflow preventers that have relief drain in vault or in other spaces subject to flooding.
- C. Do not install bypass piping around backflow preventers.
- D. Support NPS 2-1/2 and larger backflow preventers and piping on concrete piers.

3.8 FIRE-DEPARTMENT CONNECTION INSTALLATION

- A. Install ball drip valves at each check valve for fire-department connection to mains.

3.9 ALARM DEVICE INSTALLATION

- A. General: Comply with NFPA 24 for devices and methods of valve supervision. Underground valves with valve box do not require supervision.
- B. Supervisory Switches: Supervise valves in open position.
 - 1. Valves: Grind away portion of exposed valve stem. Bolt switch, with plunger in stem depression, to OS&Y gate-valve yoke.
 - 2. Indicator Posts: Drill and thread hole in upper-barrel section at target plate. Install switch, with toggle against target plate, on barrel of indicator post.
- C. Locking and Sealing: Secure unsupervised valves as follows:
 - 1. Valves: Install chain and padlock on open OS&Y gate valve.
 - 2. Post Indicators: Install padlock on wrench on indicator post.
- D. Pressure Switches: Drill and thread hole in exposed barrel of fire hydrant. Install switch.
- E. Water-Flow Indicators: Install in water-service piping in vault. Select indicator with saddle and vane matching pipe size. Drill hole in pipe, insert vane, and bolt saddle to pipe.
- F. Connect alarm devices to building's fire-alarm system, coordinate with contract 4.

3.10 CONNECTIONS

- A. Connect fire-suppression water-service piping to interior fire-suppression piping.

3.11 SLEEVE INSTALLATION

- A. General Requirements: Install sleeves for pipes and tubes passing through penetrations in exterior walls.
 - 1. Exception: Sleeves are not required for core-drilled holes.
- B. Cut sleeves to length for mounting flush with both surfaces.
- C. Install sleeves in walls as they are constructed.
- D. For exterior wall penetrations below grade, seal annular space between sleeves and piping using sleeve seals.
- E. Seal space outside of sleeves in concrete walls with grout.

3.12 SLEEVE SEAL INSTALLATION

- A. Install sleeve seals in sleeves in exterior concrete walls at fire-suppression water-service piping entries into the building.
- B. Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble sleeve seal components and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.13 FIELD QUALITY CONTROL

- A. Use test procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described below.
- B. 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.
- C. Hydrostatic Tests: Test at not less than 100 psig working pressure for one hour. All testing shall comply with the requirements of the New York City Building Code and NFPA. Pressure test: Automatic wet sprinkler system shall be subjected to a hydrostatic pressure test for a period of one hour at a pressure of at least one hundred psig at the topmost sprinkler head. Flow test: When addition, alterations, or repairs are made to a sprinkler system, the entire system shall be tested. A flow test of at least twenty gpm shall be made from a test connection at the end of the sprinkler header or the section altered or repaired. Comply with BC Chapter 9 of the 2008 NYC Building Code.

- D. Prepare test and inspection reports.

3.14 IDENTIFICATION

- A. Install continuous underground warning tape during backfilling of trench for underground fire-suppression water-service piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Division 31 Section "Earth Moving."
- B. Permanently attach equipment nameplate or marker indicating plastic fire-suppression water-service piping or fire-suppression water-service piping with electrically insulated fittings, on main electrical meter panel. Comply with requirements for identifying devices in Division 22 Section "Identification for Plumbing Piping and Equipment."

3.15 CLEANING

- A. Clean and disinfect fire-suppression water-service piping as follows:
 - 1. Purge new piping systems and parts of existing systems that have been altered, extended, or repaired before use.
 - 2. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, 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 authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, 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 to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.
- B. Prepare reports of purging and disinfecting activities.

3.16 PIPING SCHEDULE

- A. Underground fire-suppression water-service piping shall be the following:
 - 1. Mechanical-joint, ductile-iron pipe; mechanical-joint, ductile- or gray-iron, standard-pattern fittings; glands, gaskets, and bolts; and gasketed joints.

END OF SECTION 21 11 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 211313
WET-PIPE SPRINKLER SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes the following fire-suppression piping inside the building:
 - 1. Wet-pipe sprinkler systems.

1.3 SYSTEM DESCRIPTIONS

- A. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device. Hose connections are included if indicated.

1.4 PERFORMANCE REQUIREMENTS

- A. Standard Piping System Component Working Pressure: Listed for at least 175 psig.
- B. Fire-suppression sprinkler system design shall be approved by authorities having jurisdiction.
 - 1. Margin of Safety for Available Water Flow and Pressure: 10 percent, including losses through water-service piping, valves, and backflow preventers.
 - 2. Sprinkler Occupancy Hazard Classifications:
 - a. Parking Areas: Ordinary Hazard, Group 1.
 - b. Building Service Areas: Ordinary Hazard, Group 1 .
 - c. General Storage Areas: Ordinary Hazard, Group 1.
 - d. Mechanical Equipment Rooms: Ordinary Hazard, Group 1.
 - e. Office and Public Areas: Light Hazard.
 - f. Garages: Ordinary Hazard, Group 2.
 - g. Residential Living Areas: Light Hazard.

3. Minimum Density for Automatic-Sprinkler Piping Design:
 - a. Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. area.
 - b. Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. area.
 - c. Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm over 1500-sq. ft. area.
 4. Maximum Protection Area per Sprinkler: Per UL listing.
 5. Maximum Protection Area per Sprinkler:
 - a. Office Spaces: 225 sq. ft.
 - b. Storage Areas: 130 sq. ft.
 - c. Mechanical Equipment Rooms: 130 sq. ft.
 - d. Other Areas: According to NFPA 13 recommendations, unless otherwise indicated.
- C. Seismic Performance: Fire-suppression piping shall be capable of withstanding the effects of earthquake motions determined according to NFPA 13 and ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."

1.5 SUBMITTALS

- A. Product Data: For the following:
1. Piping materials, including dielectric fittings, flexible connections and sprinkler specialty fittings.
 2. Pipe hangers and supports, including seismic restraints.
 3. Valves, including listed fire-protection valves, unlisted general-duty valves, and specialty valves and trim.
 4. Sprinklers, escutcheons, and guards. Include sprinkler flow characteristics, mounting, finish, and other pertinent data.
 5. Hose connections, including size, type, and finish.
 6. Monitors.
 7. Fire hydrants.
 8. Fire department connections, including type; number, size, and arrangement of inlets; caps and chains; size and direction of outlet; escutcheon and marking; and finish.
 9. Alarm devices, including electrical data.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Fire-hydrant flow test report.
- D. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations, if applicable.
- E. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and

Test Certificate for Aboveground Piping" and "Contractor's Material and Test Certificate for Underground Piping."

- F. Welding certificates.
- G. Field quality-control test reports.
- H. Operation and Maintenance Data: For sprinkler specialties to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Installer's responsibilities include designing, fabricating, and installing fire-suppression systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.
 - a. Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer licensed in the State of New York.
- B. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.
- C. NFPA Standards: Fire-suppression-system equipment, specialties, accessories, installation, and testing shall comply with the following:
 - 1. NFPA 13, "Installation of Sprinkler Systems."

1.7 COORDINATION

- A. Coordinate layout and installation of sprinklers with other construction that penetrates ceilings, including light fixtures, HVAC equipment, and partition assemblies.

1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Sprinkler Cabinets: Finished, wall-mounting, steel cabinet with hinged cover, 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 on Project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified, or approved equal.

2.2 STEEL PIPE AND FITTINGS

- A. Threaded-End, Standard-Weight Steel Pipe: ASTM A 53/A 53M, ASTM A 135, or ASTM A 795, hot-dip galvanized where indicated and with factory- or field-formed threaded ends.
1. Cast-Iron Threaded Flanges: ASME B16.1.
 2. Malleable-Iron Threaded Fittings: ASME B16.3.
 3. Gray-Iron Threaded Fittings: ASME B16.4.
 4. Steel Threaded Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, seamless steel pipe hot-dip galvanized where indicated. Include ends matching joining method.
 5. Steel Threaded Couplings: ASTM A 865 hot-dip galvanized-steel pipe where indicated.

2.3 DIELECTRIC FITTINGS

- A. Assembly shall be copper alloy, ferrous, and insulating materials with ends matching piping system.
- B. Dielectric Unions: Factory-fabricated assembly, designed for 250-psig minimum working pressure at 180 deg F. Include insulating material that isolates dissimilar materials and ends with inside threads according to ASME B1.20.1.
1. Manufacturers:
 - a. Capitol Manufacturing Co.
 - b. Central Plastics Company.
 - c. Epco Sales, Inc.
 - d. Hart Industries International, Inc.
 - e. Watts Industries, Inc.; Water Products Div.
 - f. Zurn Industries, Inc.; Wilkins Div.
- C. Dielectric Flanges: Factory-fabricated companion-flange assembly, for 175-psig minimum working-pressure rating as required for piping system.
1. Manufacturers:

- a. Capitol Manufacturing Co.
 - b. Central Plastics Company.
 - c. Epco Sales, Inc.
 - d. Watts Industries, Inc.; Water Products Div.
- D. Dielectric Flange Insulation Kits: Components for field assembly shall include CR or phenolic gasket, PE or phenolic bolt sleeves, phenolic washers, and steel backing washers.
 - 1. Manufacturers:
 - a. Advance Products and Systems, Inc.
 - b. Calpico, Inc.
 - c. Central Plastics Company.
- E. Dielectric Nipples: Electroplated steel with inert and noncorrosive thermoplastic lining, with combination of plain or threaded ends and 300-psig working-pressure rating at 225 deg F.
 - 1. Manufacturers:
 - a. Perfection Corporation.
 - b. Precision Plumbing Products, Inc.
 - c. Victaulic Co. of America.

2.4 FLEXIBLE CONNECTORS

- A. Flexible connectors shall have materials suitable for system fluid. Include 175-psig minimum working-pressure rating and ends according to the following:
 - 1. NPS 2 (DN 50) and Smaller: Threaded.
 - 2. NPS 2-1/2 (DN 65) and Larger: Flanged.
- B. Manufacturers:
 - 1. Anamet Inc.
 - 2. Flex-Hose Co., Inc.
 - 3. Flexicraft Industries.
 - 4. Flex-Pression, Ltd.
 - 5. Flex-Weld, Inc.
 - 6. Hyspan Precision Products, Inc.
- C. Stainless-Steel-Hose/Stainless-Steel Pipe, Flexible Connectors: Corrugated, stainless-steel, inner tubing covered with stainless-steel wire braid. Include stainless-steel nipples or flanges, welded to hose.

2.5 CORROSION-PROTECTIVE ENCASEMENT FOR PIPING

- A. Encasement for Underground Metal Piping: ASTM A 674 or AWWA C105, PE film, 0.008-inch minimum thickness, tube or sheet.

2.6 SPRINKLER SPECIALTY FITTINGS

- A. Sprinkler specialty fittings shall be UL listed or FMG approved, with 175-psig minimum working-pressure rating, and made of materials compatible with piping. Sprinkler specialty fittings shall have 250-psig minimum working-pressure rating if fittings are components of high-pressure piping system.

B. Outlet Specialty Fittings:

1. Manufacturers:

- a. Anvil International, Inc.
- b. Central Sprinkler Corp.
- c. Ductilic, Inc.
- d. JDH Pacific, Inc.
- e. National Fittings, Inc.
- f. Shurjoint Piping Products, Inc.
- g. Southwestern Pipe, Inc.

2. Mechanical-T and -Cross Fittings: UL 213, ductile-iron housing with gaskets, bolts and nuts and threaded outlets.

- C. Sprinkler Drain and Alarm Test Fittings: Cast- or ductile-iron body; with threaded or locking-lug inlet and outlet, test valve, and orifice and sight glass.

1. Manufacturers:

- a. Central Sprinkler Corp.
- b. Fire-End and Croker Corp.
- c. Viking Corp.

- D. Sprinkler Branch-Line Test Fittings: Brass body with threaded inlet, capped drain outlet, and threaded outlet for sprinkler.

1. Manufacturers:

- a. Elkhart Brass Mfg. Co., Inc.
- b. Fire-End and Croker Corp.
- c. Potter-Roemer; Fire-Protection Div.

- E. Sprinkler Inspector's Test Fitting: Cast- or ductile-iron housing with threaded inlet and drain outlet and sight glass.

1. Manufacturers:
 - a. AGF Manufacturing Co.
 - b. Central Sprinkler Corp.
 - c. G/J Innovations, Inc.

F. Drop-Nipple Fittings: UL 1474, adjustable with threaded inlet and outlet, and seals.

1. Manufacturers:
 - a. CECA, LLC.
 - b. Merit.
 - c. Central Sprinkler Corp.

2.7 LISTED FIRE-PROTECTION VALVES

A. Valves shall be UL listed or FMG approved, with 175-psig minimum pressure rating. Valves shall have 250-psig minimum pressure rating if valves are components of high-pressure piping system.

B. Check Valves NPS 2 (DN 50) and Larger: UL 312, swing type, cast-iron body with flanged ends.

1. Manufacturers:
 - a. AFAC Inc.
 - b. American Cast Iron Pipe Co.; Waterous Co.
 - c. Central Sprinkler Corp.
 - d. Clow Valve Co.
 - e. Crane Co.; Crane Valve Group; Crane Valves.
 - f. Crane Co.; Crane Valve Group; Jenkins Valves.
 - g. Firematic Sprinkler Devices, Inc.
 - h. Globe Fire Sprinkler Corporation.
 - i. Grinnell Fire Protection.
 - j. Hammond Valve.
 - k. Matco-Norca, Inc.
 - l. McWane, Inc.; Kennedy Valve Div.
 - m. Mueller Company.

C. Gate Valves: UL 262, OS&Y type.

1. NPS 2 (DN 50) and Smaller: Bronze body with threaded ends.
 - a. Manufacturers:
 - 1) Crane Co.; Crane Valve Group; Crane Valves.
 - 2) Hammond Valve.
 - 3) NIBCO.

- 4) United Brass Works, Inc.
2. NPS 2-1/2 (DN 65) and Larger: Cast-iron body with flanged ends.
 - a. Manufacturers:
 - 1) Clow Valve Co.
 - 2) Crane Co.; Crane Valve Group; Crane Valves.
 - 3) Crane Co.; Crane Valve Group; Jenkins Valves.
 - 4) Hammond Valve.
 - 5) Milwaukee Valve Company.
 - 6) Mueller Company.
- D. Indicating Valves: UL 1091, with integral indicating device and ends matching connecting piping.
 1. Indicator: Electrical, 115-V ac, prewired, single-circuit, supervisory switch.
 2. NPS 2 (DN 50) and Smaller: Ball or butterfly valve with bronze body and threaded ends.
 - a. Manufacturers:
 - 1) Milwaukee Valve Company.
 - 2) NIBCO.
 - 3) Victaulic Co. of America.
 3. NPS 2-1/2 (DN 65) and Larger: Butterfly valve with cast- or ductile-iron body; wafer type or with flanged ends.
 - a. Manufacturers:
 - 1) Central Sprinkler Corp.
 - 2) Grinnell Fire Protection.
 - 3) McWane, Inc.; Kennedy Valve Div.
 - 4) Milwaukee Valve Company.
 - 5) NIBCO.

2.8 SPECIALTY VALVES

- A. Sprinkler System Control Valves: UL listed or FMG approved, cast- or ductile-iron body with flanged ends, and 175-psig (1200-kPa) minimum pressure rating. Control valves shall have 250-psig minimum pressure rating if valves are components of high-pressure piping system.
 1. Manufacturers:
 - a. AFAC Inc.
 - b. Central Sprinkler Corp.
 - c. Firematic Sprinkler Devices, Inc.

- d. Globe Fire Sprinkler Corporation.
 - e. Grinnell Fire Protection.
 - f. Reliable Automatic Sprinkler Co., Inc.
2. Alarm Check Valves: UL 193, designed for horizontal or vertical installation, with bronze seat with O-ring seals, single-hinge pin, and latch design. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gages, retarding chamber, and fill-line attachment with strainer.
- a. Drip Cup Assembly: Pipe drain with check valve to main drain piping.
- B. Automatic Drain Valves: UL 1726, NPS 3/4 (DN 20), ball-check device with threaded ends.
1. Manufacturers:
- a. AFAC Inc.
 - b. Grinnell Fire Protection.
 - c. Central Sprinkler Corp.

2.9 MANUAL CONTROL STATIONS

- A. Manual Control Stations: UL listed or FMG approved, hydraulic operation, with union, NPS 1/2 (DN 15) pipe nipple, and bronze ball valve. Include metal enclosure labeled "MANUAL CONTROL STATION" with operating instructions and cover held closed by breakable strut to prevent accidental opening.

2.10 CONTROL PANELS

- A. Description: Single-area, two-area, or single-area cross-zoned type control panel as indicated, including NEMA ICS 6, Type 1 enclosure, detector, alarm, and solenoid-valve circuitry for operation of deluge valves. Panels contain power supply; battery charger; standby batteries; field-wiring terminal strip; electrically supervised solenoid valves and polarized fire alarm bell; lamp test facility; single-pole, double-throw auxiliary alarm contacts; and rectifier.
- 1. Panels: UL listed and FMG approved when used with thermal detectors and Class A detector circuit wiring. Electrical characteristics are 120-V ac, 60 Hz, with 24-V dc rechargeable batteries.
 - 2. Manual Control Stations: Electric operation, metal enclosure, labeled "MANUAL CONTROL STATION" with operating instructions and a cover held closed by breakable strut.

2.11 SPRINKLERS

- A. Sprinklers shall be UL listed or FMG approved, with 175-psig minimum pressure rating. Sprinklers shall have 250-psig minimum pressure rating if sprinklers are components of high-pressure piping system.

- B. Manufacturers:
1. AFAC Inc.
 2. Central Sprinkler Corp.
 3. Firematic Sprinkler Devices, Inc.
 4. Globe Fire Sprinkler Corporation.
 5. Grinnell Fire Protection.
 6. Reliable Automatic Sprinkler Co., Inc.
- C. Automatic Sprinklers: With heat-responsive element complying with the following:
1. UL 199, for nonresidential applications.
 2. UL 1626, for residential applications.
 3. UL 1767, for early-suppression, fast-response applications.
- D. Sprinkler Types and Categories: Nominal 1/2-inch (12.7-mm) orifice for "Ordinary" temperature classification rating, unless otherwise indicated or required by application.
1. Open Sprinklers: UL 199, without heat-responsive element.
 - a. Orifice: 1/2 inch (12.7 mm), with discharge coefficient K between 5.3 and 5.8.
 - b. Orifice: 17/32 inch (13.5 mm), with discharge coefficient K between 7.4 and 8.2.
- E. Sprinkler types and features as follows:
1. Concealed ceiling sprinklers, including cover plate.
 2. Extended-coverage sprinklers.
 3. Flush ceiling sprinklers, including escutcheon.
 4. Pendent sprinklers.
 5. Quick-response sprinklers.
 6. Recessed sprinklers, including escutcheon.
 7. Sidewall sprinklers.
 8. Upright sprinklers.
- F. Sprinkler Finishes: Chrome plated, bronze, and painted.
- G. Special Coatings: Wax, lead, and corrosion-resistant paint.
- H. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
1. Ceiling Mounting: Metal, white finish, one piece, flat.
 2. Sidewall Mounting: Chrome-plated steel, one piece, flat.
- I. Sprinkler Guards: Wire-cage type, including fastening device for attaching to sprinkler.

2.12 MONITORS

A. Manufacturers:

1. AFAC Inc.
2. Elkhart Brass Mfg. Co., Inc.
3. Guardian Fire Equipment Incorporated.
4. Potter-Roemer; Fire-Protection Div.

B. Description: Stationary, single-waterway-type monitor for 750-gpm water stream. Include the following features:

1. Waterway: NPS 2-1/2 (DN 65) minimum, brass or stainless-steel tube.
2. Operation: Lever handle.
3. Horizontal Rotation: 360 degrees with locking device.
4. Vertical Rotation: 80-degree elevation and 60-degree depression with locking device.
5. Nozzle: UL 401, NPS 2-1/2 (DN 65), brass, adjustable from fog spray to straight stream to shutoff.

2.13 FIRE DEPARTMENT CONNECTIONS

A. Manufacturers:

1. AFAC Inc.
2. Central Sprinkler Corp.
3. Elkhart Brass Mfg. Co., Inc.
4. Fire-End and Croker Corp.
5. Guardian Fire Equipment Incorporated.
6. Potter-Roemer; Fire-Protection Div.
7. Reliable Automatic Sprinkler Co., Inc.

B. Exposed, Wall Mounted Fire Department Connection: UL 405, 175-psig pressure rating; with corrosion-resistant-metal body, brass inlets with threads according to NFPA 1963 and matching local fire department sizes and threads, and bottom outlet with pipe threads. Include brass lugged caps, gaskets, and brass chains; brass lugged swivel connection and drop clapper for each hose-connection inlet; 18-inch- high, brass sleeve; and round, floor, brass escutcheon plate with marking "AUTO SPKR & STANDPIPE."

1. Finish Including Sleeve: Polished chrome-plated.

2.14 ALARM DEVICES

A. Alarm-device types shall match piping and equipment connections.

B. Water-Motor-Operated Alarm: UL 753, mechanical-operation type with pelton-wheel operator with shaft length, bearings, and sleeve to suit wall construction and 10-inch- diameter, cast-

aluminum alarm gong with red-enamel factory finish. Include NPS 3/4 (DN 20) inlet and NPS 1 (DN 25) drain connections.

1. Manufacturers:
 - a. AFAC Inc.
 - b. Central Sprinkler Corp.
 - c. Reliable Automatic Sprinkler Co., Inc.
 - d. Star Sprinkler Inc.
 - e. Viking Corp.
- C. Hydraulically Operated Alarm: UL 464, with 6-inch- diameter, vibrating-type, metal alarm bell with red-enamel factory finish and suitable for outdoor use. Refer to plans for piping and drain requirements.
 1. Manufacturers:
 - a. Potter Electric Signal Company.
 - b. System Sensor.
 - c. Grinnell Fire Protection.
- D. Water-Flow Indicator: UL 346, electrical-supervision, paddle-operated-type, water-flow detector with 250-psig pressure rating and designed for horizontal or vertical installation. Include two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
 1. Manufacturers:
 - a. ADT Security Services, Inc.
 - b. Grinnell Fire Protection.
 - c. ITT McDonnell & Miller.
 - d. Potter Electric Signal Company.
 - e. Viking Corp.
 - f. Watts Industries, Inc.; Water Products Div.
- E. Pressure Switch: UL 753, electrical-supervision-type, water-flow switch with retard feature. Include single-pole, double-throw, normally closed contacts and design that operates on rising pressure and signals water flow.
 1. Manufacturers:
 - a. Grinnell Fire Protection.
 - b. Potter Electric Signal Company.
 - c. System Sensor.
 - d. Viking Corp.
- F. Valve Supervisory Switch: UL 753, electrical, single-pole, double-throw switch with normally closed contacts. Include design that signals controlled valve is in other than fully open position.

1. Manufacturers:

- a. McWane, Inc.; Kennedy Valve Div.
- b. Potter Electric Signal Company.
- c. System Sensor.

- G. Indicator-Post Supervisory Switch: UL 753, electrical, single-pole, double-throw switch with normally closed contacts. Include design that signals controlled indicator-post valve is in other than fully open position.

1. Manufacturers:

- a. Potter Electric Signal Company.
- b. System Sensor.
- c. Grinnell Fire Protection.

2.15 PRESSURE GAGES

A. Manufacturers:

- 1. AGF Manufacturing Co.
- 2. AMETEK, Inc.; U.S. Gauge.
- 3. Brecco Corporation.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in Part 1 "Quality Assurance" Article.
- B. Report test results promptly and in writing.

3.2 EXAMINATION

- A. Examine roughing-in to verify actual locations of piping connections before installation.
- B. Examine walls and partitions for suitable thicknesses, fire- and smoke-rated construction, and other conditions.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PIPING APPLICATIONS, GENERAL

- A. Shop weld pipe joints where welded piping is indicated.

- B. Do not use welded joints for galvanized-steel pipe.
- C. Flanges, flanged fittings, unions, nipples, and transition and special fittings with finish and pressure ratings same as or higher than system's pressure rating may be used in aboveground applications, unless otherwise indicated.
- D. Piping between Fire Department Connections and Check Valves: Galvanized, standard-weight steel pipe with threaded ends; cast- or malleable-iron threaded fittings; and threaded joints.
- E. Underground Service-Entrance Piping: Galvanized, standard-weight steel pipe with threaded ends; cast- or malleable-iron threaded fittings; and threaded joints. Include corrosion-protective encasement.

3.4 SPRINKLER SYSTEM PIPING APPLICATIONS

- A. Standard-Pressure, Wet-Pipe Sprinkler System, 175-psig Maximum Working Pressure:
 - 1. NPS 1-1/2 (DN 40) and Smaller: Threaded-end, black, standard-weight steel pipe; cast- or malleable-iron threaded fittings; and threaded joints.
 - 2. NPS 2 (DN 50): Threaded-end, black, standard-weight steel pipe; cast- or malleable-iron threaded fittings; and threaded joints.
 - 3. NPS 2-1/2 to NPS 6 (DN 65 to DN 150): Threaded-end, black, standard-weight steel pipe; cast- or malleable-iron threaded fittings; and threaded joints.

3.5 VALVE APPLICATIONS

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Listed Fire-Protection Valves: UL listed and FMG approved for applications where required by NFPA 13.
 - a. Shutoff Duty: Use ball, butterfly, or gate valves.
 - 2. Unlisted General-Duty Valves: For applications where UL-listed and FMG-approved valves are not required by NFPA 13.
 - a. Shutoff Duty: Use ball, butterfly, or gate valves.
 - b. Throttling Duty: Use ball valves.

3.6 JOINT CONSTRUCTION

- A. Refer to Section "Basic Mechanical Materials and Methods" for basic piping joint construction.
- B. Threaded Joints: Comply with NFPA 13 for pipe thickness and threads. Do not thread pipe smaller than NPS 8 (DN 200) with wall thickness less than Schedule 40 unless approved by

authorities having jurisdiction and threads are checked by a ring gage and comply with ASME B1.20.1.

- C. Mechanically Formed, Copper-Tube-Outlet Joints: Use UL-listed tool and procedure. Drill pilot hole in copper tube, form branch for collar, dimple tube to form seating stop, and braze branch tube into formed-collar outlet.
- D. Dissimilar-Metal Piping Joints: Construct joints using dielectric fittings compatible with both piping materials.
 - 1. NPS 2 (DN 50) and Smaller: Use dielectric unions, couplings, or nipples.
 - 2. NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Use dielectric flanges.
 - 3. NPS 5 (DN 125) and Larger: Use dielectric flange insulation kits.

3.7 SERVICE-ENTRANCE PIPING

- A. Connect fire-suppression piping to water-service piping of size and in location indicated for service entrance to building.
- B. Install shutoff valve, backflow preventer, pressure gage, drain, and other accessories indicated at connection to water-service piping.
- C. Install shutoff valve, check valve, pressure gage, and drain at connection to water service.

3.8 PIPING INSTALLATION

- A. Refer to Section "Basic Mechanical Materials and Methods" for basic piping installation.
- B. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
 - 1. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with Commissioner before deviating from approved working plans.
- C. Use approved fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
- D. Install unions adjacent to each valve in pipes NPS 2 (DN 50) and smaller. Unions are not required on flanged devices.
- E. Install flanges or flange adapters on valves, apparatus, and equipment having NPS 2-1/2 (DN 65) and larger connections.
- F. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, sized and located according to NFPA 13.

- G. Install sprinkler piping with drains for complete system drainage.
- H. Install ball drip valves to drain piping between fire department connections and check valves. Drain to floor drain or outside building.
- I. Install alarm devices in piping systems.
- J. Hangers and Supports: Comply with NFPA 13 for hanger materials.
 - 1. Install sprinkler system piping according to NFPA 13.
- K. Earthquake Protection: Install piping according to NFPA 13 to protect from earthquake damage.
- L. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than NPS 1/4 (DN 8) and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.
- M. Fill wet-pipe sprinkler system piping with water.

3.9 VALVE INSTALLATION

- A. Install listed fire-protection valves, unlisted general-duty valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.
- 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. Valves for Wall-Type Fire Hydrants: Install nonrising-stem gate valve in water-supply pipe.
- D. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water supply sources.
- E. Specialty Valves:
 - 1. Alarm Check Valves: Install in vertical position for proper direction of flow, including bypass check valve and retarding chamber drain-line connection.

3.10 SPRINKLER APPLICATIONS

- A. Drawings indicate sprinkler types to be used. Where specific types are not indicated, use the following sprinkler types:
 - 1. Rooms without Ceilings: Upright sprinklers.
 - 2. Rooms with Suspended Ceilings: Flush sprinklers.

3. Wall Mounting: Sidewall sprinklers.
4. Special Applications: Extended-coverage, flow-control.
5. Sprinkler Finishes:
 - a. Upright, Pendent, and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.
 - b. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.
 - c. Flush Sprinklers: Bright chrome, with painted white escutcheon.
 - d. Recessed Sprinklers: Bright chrome, with bright chrome escutcheon.

3.11 SPRINKLER INSTALLATION

- A. Install sprinklers in suspended ceilings in center of acoustical ceiling panels and tiles.
- B. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing. Use dry-type sprinklers with water supply from heated space.

3.12 MONITOR INSTALLATION

- A. Install monitor bases securely attached to building substrate.

3.13 FIRE HYDRANT INSTALLATION

- A. Install fire hydrants mounted in vertical wall with shutoff valve inside building in heated space.

3.14 FIRE DEPARTMENT CONNECTION INSTALLATION

- A. Install freestanding-type, fire department connections in level surface.
 1. Install protective pipe bollards on two sides of each fire department connection.
- B. Install ball drip valve at each check valve for fire department connection.

3.15 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment to allow service and maintenance.
- C. Connect water-supply piping to fire-suppression piping. Include backflow preventer between potable-water piping and fire-suppression piping. Refer to Contract 2 for requirements.
- D. Install ball drip valves at each check valve for fire department connection. Drain to floor drain or outside building.

- E. Connect piping to specialty valves, specialties, fire department connections, and accessories.
- F. Electrical Connections: Power wiring is specified in Division 26.
- G. Connect alarm devices to fire alarm.
- H. Ground equipment according to Division 26 Section "Grounding and Bonding."
- I. Connect wiring according to Division 26 Section "Conductors and Cables."
- J. 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 and UL 486B.

3.16 LABELING AND IDENTIFICATION

- A. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13 and Section "Mechanical Identification."

3.17 PAINTING

- A. Dedicated sprinkler piping shall be painted and such painting certified in accordance with Sections 903.6.1 through 903.6.5. In addition to painting, sprinkler piping may also be identified by lettered legend in accordance with ANSI A13.1. Where the piping is required to be listed and labeled such painting shall not obscure such labeling.
 - 1. Exceptions:
 - a. Attachments, gauges, valves and operable parts of sprinkler systems other than valve handles.
 - b. Horizontal branch lines.
- B. Cross connections and risers in new buildings, including buildings constructed pursuant to Section 28-101.4.2 of the Administrative Code, shall be painted red and the handles of valves serving dedicated sprinklers shall be painted green prior to the hydrostatic pressure test regardless of whether they will be enclosed at a later point in time.
- C. For all buildings where sprinkler are not subject to a special inspection pursuant to Section 1704.21 of NYC Building Code, a licensed master plumber, licensed master fire suppression piping contractor, registered design professional or an individual holding an appropriate certificate of fitness from the Fire Department for the operation and/or maintenance of such system shall certify on forms provided by the department that all required painting has been completed in accordance with Section 903.6. Such certification shall be maintained on the premises and made available for inspection by the department and the Fire Department.

3.18 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 3. Energize circuits to electrical equipment and devices.
 4. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
 5. Coordinate with fire alarm tests. Operate as required.
 6. Verify that equipment hose threads are same as local fire department equipment.
- B. Report test results promptly and in writing to Commissioner and authorities having jurisdiction.

3.19 CLEANING AND PROTECTION

- A. Clean dirt and debris from sprinklers.
- B. Remove and replace sprinklers with paint other than factory finish.
- C. Protect sprinklers from damage until Substantial Completion.

3.20 DEMONSTRATION

- A. Engage a factory-authorized service representative to train City of New York's maintenance personnel to adjust, operate, and maintain specialty valves.

END OF SECTION 211313

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 220400
BASIC PLUMBING REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions apply to this and the other sections.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes general administrative and procedural requirements for installations. The following administrative and procedural requirements are included in this Section to expand the requirements specified in General Conditions:
 - 1. Submittals.
 - 2. Coordination drawings.
 - 3. Record documents.
 - 4. Maintenance manuals.
 - 5. Rough-ins.
 - 6. Installations.
 - 7. Cutting and patching.

1.3 SUBMITTALS

- A. General: Follow the procedures specified in General Conditions Section "SUBMITTALS."
- B. Increase, by the quantity listed below, the number of related shop drawings, product data, and samples submitted, to allow for required distribution plus two copies of each submittal required, which will be retained by the Consulting Professional engineer licensed in the State of New York.
 - 1. Shop Drawings - Initial Submittal: 1 additional blue- or black-line prints.
 - 2. Shop Drawings - Final Submittal: 1 additional blue- or black-line prints.
 - 3. Product Data: 1 additional copy of each item.
 - 4. Samples: 1 addition as set.
- C. Additional copies may be required by individual sections of these Specifications.

- D. The Contractor shall, within five (5) business days from the contract award, submit a "Shop Drawing Submittal and Review Schedule", listing all shop drawings, catalog data, wiring diagrams, etc., indicating submission dates and shall allow for at least five (5) business days for review and approval.
- E. No deviations will be allowed from the submitted "Shop Drawing Submittal and Review Schedule".
- F. All submittals must be first checked and approved by the Construction Manager. Submittals not first approved by the General Contractor/Project Manager, will be returned without the approval stamp.
- G. Submittals not required by the contract documents will not be accepted or reviewed.
- H. Submittals indicating design changes, or system substitutions will not be accepted or reviewed.
- I. The Contractor shall, prior to purchasing, manufacturing, or installing, submit to the Commissioner two (2) prints and one (1) reproducible sepia of the following:
 - 1. Shop drawings of the entire piping systems.
 - a. Shop drawings shall be drawn to the scale not smaller than 3/8"=1'-0".
 - b. Shop drawings shall indicate other elements located in the vicinity of the piping systems, such as: electrical fixtures, conduits, other piping systems, equipment, appliances, plumbing fixtures, structural elements, etc.
 - c. Locations shall be coordinated with all other trades and with all Architectural drawings.
- J. The Contractor shall, prior to purchasing, manufacturing, or installing, submit to the Commissioner six (6) copies of the following:
 - 1. Catalog data indicating fittings, valves, hangers, attachments, etc.
 - 2. Catalog data for all equipment, appliances, devices, etc.
 - 3. Point - to - point wiring diagrams.
 - 4. Sequence of operation.

1.4 COORDINATION DRAWINGS

- A. Prepare coordination drawings to a scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:

1. Indicate the proposed locations of piping, equipment, and materials. Include the following:
 - a. Clearances for installing and maintaining insulation.
 - b. Clearances for servicing and maintaining equipment, including tube removal, filter removal, and space for equipment disassembly required for periodic maintenance.
 - c. Equipment connections and support details.
 - d. Fire-rated wall and floor penetrations.
 - e. Valve stem movement.
2. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
3. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
4. Prepare **REFLECTED CEILING PLANS** to coordinate and integrate installations, air outlets and inlets, light fixtures, fire alarm components, communication systems components, public address systems, sprinklers, and other ceiling-mounted items.

1.5 WRITTEN REPORTS

- A. This Contractor shall submit to the Commissioner the following reports for review and approval:
 1. Piping Pressure Test Report, certifying that all sections of the piping were air pressure tested and that there was no reduction in pressure indication during the duration of the tests.
 2. Piping Functional Test Report, certifying that all sections of the drain piping were tested for natural gravity draining, that there were no sections of the piping that do not drain or create flooding conditions.
- B. Installation of non-removable ceilings and partitions shall proceed upon acceptance and approval of the Reports.

1.6 RECORD DOCUMENTS

- A. Prepare record documents. In addition to the requirements specified in General Conditions, indicate the following installed conditions:
 2. Mains and branches of piping systems, with valves and control devices located and numbered, concealed unions located, and with items requiring maintenance located (i.e., strainers, tanks, etc.). Valve location diagrams, complete with valve tag chart. Refer to Section "Identification." Indicate actual inverts and horizontal locations of underground piping.
 3. Equipment locations (exposed and concealed), dimensioned from prominent building lines.

4. Approved substitutions, Contract Modifications, and actual equipment and materials installed.
5. Contract Modifications, actual equipment and materials installed.

1.7 MAINTENANCE MANUALS

- A. Prepare maintenance manuals. In addition to the requirements specified in General Conditions, include the following information for equipment items:
 1. Description of function, normal operating characteristics and limitations, performance curves, professional engineer licensed in the State of New Yorking data and tests, and complete nomenclature and commercial numbers of replacement parts.
 2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
 3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
 4. Servicing instructions and lubrication charts and schedules.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to the project properly identified with names, model numbers, types, grades, compliance labels, and other information needed for identification.

1.9 COMPLIANCE

- A. All work and materials shall comply with the laws and requirements of authorities having jurisdiction.
- B. All work, materials, equipment, devices, etc., shall be in compliance with requirements and shall be vandal-proof, weather or not specifically so called for elsewhere in construction drawings and specifications.

1.10 ELECTRICAL REQUIREMENTS

- A. This Contractor shall notify the General Contractor as to the extent and capacity of the power wiring required for the equipment (such as air conditioning units, exhaust fans, condensate removal pump sets, kitchen appliances, sprinkler systems, automatic temperature and control systems, etc.) installed by this Contractor, prior to submitting his proposal. It shall be understood that the wiring not included in the notification will be performed by this Contractor.

1.11 CONTROL WIRING

- A. All control wiring shall be performed under this contract.

1.12 MISCELLANEOUS STEEL AND VIBRATION ISOLATION

- A. Miscellaneous steel and vibration isolators shall be provided under this contract.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 ROUGH-IN

- A. Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

3.2 INSTALLATIONS

- A. General: Sequence, coordinate, and integrate the various elements of systems, materials, and equipment. Comply with the following requirements:
 - 1. Coordinate systems, equipment, and materials installation with other building components.
 - 2. Verify all dimensions by field measurements.
 - 3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for installations.
 - 4. Coordinate the installation of required supporting devices and sleeves to be set in poured-in-place concrete and other structural components, as they are constructed.
 - 5. Sequence, coordinate, and integrate installations of materials and equipment for efficient flow of the Work.
 - 6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
 - 7. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Commissioner.
 - 8. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
 - 9. Install equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations. Extend grease fittings to an accessible location.

10. Install access panel or doors where units are concealed behind finished surfaces. Access panels and doors are specified in Section "ACCESS DOORS"
11. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

3.3 CUTTING AND PATCHING

- A. General: Perform cutting and patching in accordance with General Conditions Section "CUTTING AND PATCHING." In addition to the requirements specified in General Conditions, the following requirements apply:
 1. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.
- B. Perform cutting, fitting, and patching of equipment and materials required to:
 1. Uncover Work to provide for installation of ill-timed Work.
 2. Remove and replace defective Work.
 3. Remove and replace Work not conforming to requirements of the Contract Documents.
 4. Remove samples of installed Work as specified for testing.
 5. Install equipment and materials in existing structures.
 6. Upon written instructions from the Commissioner, uncover and restore Work to provide for Commissioner/Professional engineer licensed in the State of New York observation of concealed Work.
- C. Cut, remove and legally dispose of selected equipment, components, and materials as indicated, including but not limited to removal of piping, heating units, plumbing fixtures and trim, and other items made obsolete by the new Work.
- D. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
- E. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
 1. Patch finished surfaces and building components using new materials specified for the original installation and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.
 - a. Refer to General Conditions Section "DEFINITIONS AND STANDARDS" for definition of "experienced Installer."

END OF SECTION 22 04 00

SECTION 220514

COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.
- C. Division 1, Section 018113.3 – Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings.
- D. Division 1, Section 018113 – Sustainable Design Requirements (LEED Building)
- E. Division 1, Section 017419 - Construction Waste Management and Disposal
- F. Division 1, Section 018119 - Construction IAQ Requirements

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Piping materials and installation instructions common to most piping systems.
 - 2. Transition fittings.
 - 3. Dielectric fittings.
 - 4. Mechanical sleeve seals.
 - 5. Sleeves.
 - 6. Escutcheons.
 - 7. Grout.
 - 8. Painting and finishing.
 - 9. Supports and anchorages.
 - 10. Plumbing Demolition.

1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspace, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
- F. The following are industry abbreviations for plastic materials:
 - 1. PE: Polyethylene plastic.
 - 2. PVC: Polyvinyl chloride plastic.
- G. The following are industry abbreviations for rubber materials:
 - 1. EPDM: Ethylene-propylene-diene terpolymer rubber.
 - 2. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Transition fittings.
 - 2. Dielectric fittings.
 - 3. Mechanical sleeve seals.
 - 4. Escutcheons.
- B. Welding certificates.
- C. LEED BUILDING SUBMITTAL REQUIREMENTS:
 - 1. Provide for all field-applied adhesives, sealants (used as fillers), and paints: Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, paints and coatings applied on the interior of the building. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

1.5 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- B. Electrical Characteristics for PLUMBING Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If

minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

C. LEED BUILDING REQUIREMENTS

1. GENERAL REQUIREMENTS: The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.
2. PERFORMANCE CRITERIA: All field applied adhesives, sealants (used as fillers), prime painting, and finished painting shall comply with the low VOC requirements called out in Division 1, Section 018113.3 - Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, & Architectural Coatings, and Section 09900 - Interior Paint.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes 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.
- B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 COORDINATION

- A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for Plumbing installations.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- C. Coordinate requirements for access panels and doors for Plumbing items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in "Access Doors and Frames."

1.8 WORK INCLUDED

- A. Related Work and Requirements Include:
 1. Requirements of Construction Waste Management, Section 017419.
 - a. The Commissioner has established that as many of the surplus and waste material as economically feasible shall be reused, salvaged, or recycled. To that end, the Contractor for Electrical Work shall participate in the development of the Waste Management Plan, and collect, sort and deposit in designated containers, their

waste, non-returned surplus materials and rubbish in accordance with the approved Plan.

- b. Project Diversion Goals are stated in Section 017419 – Construction Waste Management. The Contractor for Electrical Work shall meet or exceed the minimum percentage of waste stated there for diversion from landfill, unless the Contractor for General Construction Work designates a different amount. Specific items/categories shall be in accordance with the Documents and as established in the Plan.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified, or approved equal.

2.2 PIPE, TUBE, AND FITTINGS

- A. Refer to individual piping Sections for pipe, tube, and fitting materials and joining methods.

2.3 JOINING MATERIALS

- A. Refer to individual piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - 1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 - 2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

2.4 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.
- C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.
 - 1. Manufacturers:
 - a. Capitol Manufacturing Co.
 - b. Central Plastics Company.
 - c. Eclipse, Inc.
 - d. Epco Sales, Inc.
 - e. Hart Industries, International, Inc.
 - f. Watts Industries, Inc.; Water Products Div.
 - g. Zurn Industries, Inc.; Wilkins Div.
- D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.
 - 1. Manufacturers:
 - a. Capitol Manufacturing Co.
 - b. Central Plastics Company.
 - c. Epco Sales, Inc.
 - d. Watts Industries, Inc.; Water Products Div.
- E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
 - 1. Manufacturers:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Central Plastics Company.
 - d. Pipeline Seal and Insulator, Inc.
 - 2. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig minimum working pressure where required to suit system pressures.

2.5 MECHANICAL SLEEVE SEALS

- A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
 - 1. Manufacturers:

- a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Pipeline Seal and Insulator, Inc.
- 2. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 3. Pressure Plates: Stainless steel. Include two for each sealing element.
 - 4. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.6 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.
- B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
- C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

2.7 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: With set screw.
 - 1. Finish: Polished chrome-plated.
- D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
 - 1. Finish: Polished chrome-plated.
- E. One-Piece, Stamped-Steel Type: With set screw and chrome-plated finish.
- F. Split-Plate, Stamped-Steel Type: With concealed hinge, set screw, and chrome-plated finish.
- G. One-Piece, Floor-Plate Type: Cast-iron floor plate.
- H. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

2.8 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 - 1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.
 - 3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PLUMBING DEMOLITION

- A. Refer to General Conditions Sections "Cutting and Patching" and "Selective Demolition" for general demolition requirements and procedures.
- B. Disconnect, demolish, and remove plumbing systems, equipment, and components indicated to be removed.
 - 1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - 2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
 - 3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - 4. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - 5. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to City of New York.
- C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Sections specifying piping systems.
- B. 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 Coordination Drawings.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

- 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 otherwise.
- 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. Select system components with pressure rating equal to or greater than system operating pressure.
- L. Install escutcheons for penetrations of walls, ceilings, and floors.
- M. Sleeves are not required for core-drilled holes.
- N. Permanent sleeves are not required for holes formed by removable PE sleeves.
- O. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
- P. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
 - 1. 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. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 - 3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. Steel Pipe Sleeves: For pipes smaller than NPS 6.
 - 4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to "Joint Sealants" for materials and installation.
- Q. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches in diameter.
 2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
 3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- R. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- S. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials.
- T. Verify final equipment locations for roughing-in.
- U. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.3 PIPING JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- E. 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 unless dry seal threading is specified.
 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- F. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.

3.4 PIPING CONNECTIONS

- A. Make connections according to 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. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install Plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

3.6 PAINTING

- A. Painting of Plumbing systems, equipment, and components is specified.
- B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Refer to "Metal Fabrications" for structural steel.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor Plumbing materials and equipment.
- C. Field Welding: Comply with AWS D1.1.

3.8 GROUTING

- A. Mix and install grout for Plumbing equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

3.9 WASTE MANAGEMENT AND DISPOSAL

- A. Comply with the requirements established by the Contractor for General Construction Work to separate and recycle, salvage or reuse cast-offs, surplus and waste material in accordance with the Waste Management Plan.
- B. Arrange for suppliers to take back shipping and packing materials for reuse or recycling to the maximum extent economically feasible, or include them in the Waste Management Plan.

END OF SECTION 22 05 14

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 220516

EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Metal-bellows expansion joints.
 - 2. Flexible-hose expansion joints.
 - 3. Pipe bends and loops.
 - 4. Alignment guides and anchors.

1.3 PERFORMANCE REQUIREMENTS

- A. Compatibility: Products shall be suitable for piping system fluids, materials, working pressures, and temperatures.
- B. Capability: Products shall absorb 200 percent of maximum axial movement between anchors.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Delegated-Design Submittal: For each anchor and alignment guide indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer licensed in the State of New York responsible for their preparation.
 - 1. Design Calculations: Calculate requirements for thermal expansion of piping systems and for selecting and designing expansion joints, loops, and bends.
 - 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. Welding certificates.
- D. Product Certificates: For each type of pipe expansion joint, signed by product manufacturer.
- E. Maintenance Data: For pipe expansion joints to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. Steel Shapes and Plates: AWS D1.1, "Structural Welding Code - Steel."
 - 2. Welding to Piping: ASME Boiler and Pressure Vessel Code: Section IX.

PART 2 - PRODUCTS

2.1 EXPANSION JOINTS

- A. Metal-Bellows Expansion Joints: ASTM F 1120, circular-corrugated-bellows type with external tie rods.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Adsko Manufacturing, LLC.
 - b. Anamet, Inc.
 - c. Badger Industries.
 - d. Expansion Joint Systems, Inc.
 - e. Flex-Hose Co., Inc.
 - f. Flexicraft Industries.
 - g. Flex-Pression, Ltd.
 - h. Flex-Weld, Inc.
 - 2. Metal-Bellows Expansion Joints for Copper Piping: Single- or multiple-ply phosphor-bronze bellows, copper pipe end connections, and brass shrouds.
 - 3. Metal-Bellows Expansion Joints for Steel Piping: Single- or multiple-ply stainless-steel bellows, steel pipe end connections, and carbon-steel shroud.
 - 4. Minimum Pressure Rating: 150 psig, unless otherwise indicated.
 - 5. Configuration: Single- or double-bellows type with base, unless otherwise indicated.
 - 6. End Connections: Flanged or weld.
- B. Flexible-Hose Expansion Joints: Manufactured assembly with two flexible-metal-hose legs joined by long-radius, 180-degree return bend or center section of flexible hose; with inlet and outlet elbow fittings, corrugated-metal inner hoses, and braided outer sheaths.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Flex-Hose Co., Inc.
 - b. Flexicraft Industries.

- c. Flex-Pression, Ltd.
 - d. Metraflex, Inc.
2. Flexible-Hose Expansion Joints for Copper Piping: Copper-alloy fittings with solder-joint end connections.
- a. NPS 2 and Smaller: Bronze hoses and single-braid bronze sheaths with 450 psig at 70 deg F and 340 psig at 450 deg F ratings.
 - b. NPS 2-1/2 to NPS 4: Stainless-steel hoses and single-braid, stainless-steel sheaths with 300 psig at 70 deg F and 225 psig at 450 deg F ratings.
3. Flexible-Hose Expansion Joints for Steel Piping: Carbon-steel fittings with threaded end connections for NPS 2 and smaller and flanged end connections for NPS 2-1/2 and larger.
- a. NPS 2 and Smaller: Stainless-steel hoses and single-braid, stainless-steel sheaths with 450 psig at 70 deg F and 325 psig at 600 deg F ratings.
 - b. NPS 2-1/2 to NPS 6: Stainless-steel hoses and single-braid, stainless-steel sheaths with 200 psig at 70 deg F and 145 psig at 600 deg F ratings.
4. Flexible-Hose Expansion Joints for Steel Piping: Carbon-steel fittings with threaded end connections for NPS 2 and smaller and flanged end connections for NPS 2-1/2 and larger.
- a. NPS 2 and Smaller: Stainless-steel hoses and double-braid, stainless-steel sheaths with 700 psig at 70 deg F and 515 psig at 600 deg F ratings.
 - b. NPS 2-1/2 to NPS 6: Stainless-steel hoses and double-braid, stainless-steel sheaths with 275 psig at 70 deg F and 200 psig at 600 deg F ratings.

2.2 ALIGNMENT GUIDES

- A. Description: Steel, factory fabricated, with bolted two-section outer cylinder and base for alignment of piping and two-section guiding spider for bolting to pipe.
1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
- a. Adsko Manufacturing, LLC.
 - b. Advanced Thermal Systems, Inc.
 - c. Flex-Hose Co., Inc.
 - d. Flexicraft Industries.
 - e. Flex-Weld, Inc.

2.3 MATERIALS FOR ANCHORS

- A. Steel Shapes and Plates: ASTM A 36/A 36M.
- B. Bolts and Nuts: ASME B18.10 or ASTM A 183, steel, hex head.
- C. Washers: ASTM F 844, steel, plain, flat washers.

- D. Mechanical Fasteners: Insert-wedge-type stud with expansion plug anchor for use in hardened portland cement concrete, and tension and shear capacities appropriate for application.
 - 1. Stud: Threaded, zinc-coated carbon steel.
 - 2. Expansion Plug: Zinc-coated steel.
 - 3. Washer and Nut: Zinc-coated steel.
- E. Chemical Fasteners: Insert-type-stud bonding system anchor for use with hardened portland cement concrete, and tension and shear capacities appropriate for application.
 - 1. Bonding Material: ASTM C 881, Type IV, Grade 3, 2-component epoxy resin suitable for surface temperature of hardened concrete where fastener is to be installed.
 - 2. Stud: ASTM A 307, zinc-coated carbon steel with continuous thread on stud, unless otherwise indicated.
 - 3. Washer and Nut: Zinc-coated steel.
- F. Concrete: Portland cement mix, 3000 psi minimum.
- G. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink, 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 EXPANSION-JOINT INSTALLATION

- A. Install manufactured, nonmetallic expansion joints according to FSA's "Technical Handbook: Non-Metallic Expansion Joints and Flexible Pipe Connectors."
- B. Install expansion joints of sizes matching size of piping in which they are installed.
- C. Install alignment guides to allow expansion and to avoid end-loading and torsional stress.

3.2 PIPE BEND AND LOOP INSTALLATION

- A. Install pipe bends and loops cold-sprung in tension or compression as required to partly absorb tension or compression produced during anticipated change in temperature.
- B. Attach pipe bends and loops to anchors.
 - 1. Steel Anchors: Attach by welding. Comply with ASME B31.9 and ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 - 2. Concrete Anchors: Attach by fasteners. Follow fastener manufacturer's written instructions.

3.3 SWING CONNECTIONS

- A. Connect risers and branch connections to mains with at least five pipe fittings, including tee in main.
- B. Connect risers and branch connections to terminal units with at least four pipe fittings, including tee in riser.
- C. Connect mains and branch connections to terminal units with at least four pipe fittings, including tee in main.

3.4 ALIGNMENT-GUIDE INSTALLATION

- A. Install guides on piping adjoining pipe expansion fittings and loops.
- B. Attach guides to pipe and secure to building structure.

3.5 ANCHOR INSTALLATION

- A. Install anchors at locations to prevent stresses from exceeding those permitted by ASME B31.9 and to prevent transfer of loading and stresses to connected equipment.
- B. Fabricate and install steel anchors by welding steel shapes, plates, and bars to piping and to structure. Comply with ASME B31.9 and AWS D1.1.
- C. Construct concrete anchors of poured-in-place concrete of dimensions indicated and include embedded fasteners.
- D. Install pipe anchors according to expansion-joint manufacturer's written instructions if expansion joints are indicated.
- E. Use grout to form flat bearing surfaces for expansion fittings, guides, and anchors installed on or in concrete.

END OF SECTION 22 05 16

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 220519

METERS AND GAGES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Thermometers.
 - 2. Gages.
 - 3. Test plugs.
- B. Related Sections:
 - 1. Section "Domestic Water Piping" for domestic and fire-protection water service meters inside the building.
 - 2. Section "Facility Natural-Gas Piping" for gas meters.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated; include performance curves.
- B. Shop Drawings: Schedule for thermometers and gages indicating manufacturer's number, scale range, and location for each.
- C. Product Certificates: For each type of thermometer and gage, signed by product manufacturer.

PART 2 - PRODUCTS

2.1 METAL-CASE, LIQUID-IN-GLASS THERMOMETERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Palmer - Wahl Instruments Inc.

2. Weiss Instruments, Inc.

- B. Case: Die-cast aluminum or brass, 7 inches long.
- C. Tube: Red or blue reading, mercury or organic-liquid filled, with magnifying lens.
- D. Tube Background: Satin-faced, nonreflective aluminum with permanently etched scale markings.
- E. Window: Glass.
- F. Connector: Adjustable type, 180 degrees in vertical plane.
- G. Stem: Copper-plated steel, aluminum, or brass for thermowell installation and of length to suit installation.
- H. Accuracy: Plus or minus 1 percent of range or plus or minus 1 scale division to maximum of 1.5 percent of range.

2.2 THERMOWELLS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. AMETEK, Inc.; U.S. Gauge Div.
 - 2. Ashcroft Commercial Instrument Operations; Dresser Industries; Instrument Div.
 - 3. Ernst Gage Co.
- B. Manufacturers: Same as manufacturer of thermometer being used.
- C. Description: Pressure-tight, socket-type metal fitting made for insertion into piping and of type, diameter, and length required to hold thermometer.

2.3 PRESSURE GAGES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. AMETEK, Inc.; U.S. Gauge Div.
 - 2. Ashcroft Commercial Instrument Operations; Dresser Industries; Instrument Div.
 - 3. Ernst Gage Co.
- B. Direct-Mounting, Dial-Type Pressure Gages: Indicating-dial type complying with ASME B40.100.
 - 1. Case: Liquid-filled type, drawn steel or cast aluminum, 4-1/2-inch diameter.
 - 2. Pressure-Element Assembly: Bourdon tube, unless otherwise indicated.

3. Pressure Connection: Brass, NPS 1/4 (DN 8), bottom-outlet type unless back-outlet type is indicated.
4. Movement: Mechanical, with link to pressure element and connection to pointer.
5. Dial: Satin-faced, nonreflective aluminum with permanently etched scale markings.
6. Pointer: Red or other dark-color metal.
7. Window: Glass.
8. Ring: Brass.
9. Accuracy: Grade A, plus or minus 1 percent of middle half scale.
10. Vacuum-Pressure Range: 30-in. Hg of vacuum to 15 psig of pressure.
11. Range for Fluids under Pressure: Two times operating pressure.

C. Pressure-Gage Fittings:

1. Valves: NPS 1/4 (DN 8) brass or stainless-steel needle type.
2. Snubbers: ASME B40.5, NPS 1/4 (DN 8) brass bushing with corrosion-resistant, porous-metal disc of material suitable for system fluid and working pressure.

2.4 TEST PLUGS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Flow Design, Inc.
2. MG Piping Products Co.
3. National Meter, Inc.

B. Description: Corrosion-resistant brass or stainless-steel body with core inserts and gasketed and threaded cap, with extended stem for units to be installed in insulated piping.

C. Minimum Pressure and Temperature Rating: 500 psig at 200 deg F.

D. Core Inserts: One or two self-sealing rubber valves.

1. Insert material for water service at 20 to 200 deg F shall be CR.
2. Insert material for water service at minus 30 to plus 275 deg F shall be EPDM.

E. Test Kit: Furnish one test kit(s) containing one pressure gage and adaptor, one thermometer(s), and carrying case. Pressure gage, adapter probes, and thermometer sensing elements shall be of diameter to fit test plugs and of length to project into piping.

1. Pressure Gage: Small bourdon-tube insertion type with 2- to 3-inch- diameter dial and probe. Dial range shall be 0 to 200 psig.
2. Low-Range Thermometer: Small bimetallic insertion type with 1- to 2-inch- diameter dial and tapered-end sensing element. Dial ranges shall be 25 to 125 deg F.
3. High-Range Thermometer: Small bimetallic insertion type with 1- to 2-inch- diameter dial and tapered-end sensing element. Dial ranges shall be 0 to 220 deg F.
4. Carrying case shall have formed instrument padding.

PART 3 - EXECUTION

3.1 THERMOMETER APPLICATIONS

- A. Install liquid-in-glass thermometers in the outlet of each domestic, hot-water storage tank.
- B. Install liquid-filled-case-type, bimetallic-actuated dial thermometers at suction and discharge of each pump.
- C. Provide the following temperature ranges for thermometers:
 - 1. Domestic Hot Water: 30 to 180 deg F, with 2-degree scale divisions.
 - 2. Domestic Cold Water: 0 to 100 deg F, with 2-degree scale divisions.

3.2 GAGE APPLICATIONS

- A. Install dry-case-type pressure gages for discharge of each pressure-reducing valve.
- B. Install liquid-filled-case-type pressure gages at suction and discharge of each pump.

3.3 INSTALLATIONS

- A. Install direct-mounting thermometers and adjust vertical and tilted positions.
- B. Install thermowells with socket extending a minimum of 2 inches into fluid, one-third of diameter of pipe, to center of pipe and in vertical position in piping tees where thermometers are indicated.
- C. Install direct-mounting pressure gages in piping tees with pressure gage located on pipe at most readable position.
- D. Install needle-valve and snubber fitting in piping for each pressure gage.
- E. Install test plugs in tees in piping.
- F. Install permanent indicators on walls or brackets in accessible and readable positions.
- G. Install connection fittings for attachment to portable indicators in accessible locations.
- H. Install thermometers and gages adjacent to machines and equipment to allow service and maintenance for thermometers, gages, machines, and equipment.
- I. Adjust faces of thermometers and gages to proper angle for best visibility.

END OF SECTION 22 05 19

SECTION 220523

GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes the following general-duty valves:
 - 1. Copper-alloy ball valves.
 - 2. Bronze check valves.
 - 3. Gray-iron swing check valves.
 - 4. Bronze gate valves.
 - 5. Cast-iron gate valves.
- B. Related Sections include the following:
 - 1. Section "Identification for Plumbing Piping and Equipment" for valve tags and charts.

1.3 SUBMITTALS

- A. Product Data: For each type of valve indicated. Include body, seating, and trim materials; valve design; pressure and temperature classifications; end connections; arrangement; dimensions; and required clearances. Include list indicating valve and its application. Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.

1.4 QUALITY ASSURANCE

- A. ASME Compliance for Ferrous Valves: ASME B16.10 and ASME B16.34 for dimension and design criteria.
- B. NSF Compliance: NSF 61 for valve materials for potable-water service.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.
3. Set angle, gate, and globe valves closed to prevent rattling.
4. Set ball valves open to minimize exposure of functional surfaces.
5. Block check valves in either closed or open position.

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 handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified, or approved equal.

2.2 VALVES, GENERAL

- A. Refer to Part 3 "Valve Applications" Article for applications of valves.
- B. Bronze Valves: NPS 2 (DN 50) and smaller with threaded ends, unless otherwise indicated.
- C. Ferrous Valves: NPS 2-1/2 (DN 65) and larger with flanged ends, unless otherwise indicated.
- D. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- E. Valve Sizes: Same as upstream pipe, unless otherwise indicated.
- F. Valve Actuators:
- G. Extended Valve Stems: On insulated valves.

H. Valve Flanges: ASME B16.1 for cast-iron valves, ASME B16.5 for steel valves, and ASME B16.24 for bronze valves.

I. Valve Grooved Ends: AWWA C606.

1. Solder Joint: With sockets according to ASME B16.18.

a. Caution: Use solder with melting point below 840 deg F for angle, check, gate, and globe valves; below 421 deg F for ball valves.

2. Threaded: With threads according to ASME B1.20.1.

J. Valve Bypass and Drain Connections: MSS SP-45.

2.3 COPPER-ALLOY BALL VALVES

A. Manufacturers:

1. Two-Piece, Copper-Alloy Ball Valves:

- a. Conbraco Industries, Inc.; Apollo Div.
- b. Crane Co.; Crane Valve Group; Crane Valves.
- c. Crane Co.; Crane Valve Group; Jenkins Valves.
- d. Crane Co.; Crane Valve Group; Stockham Div.
- e. DynaQuip Controls.
- f. Flow-Tek, Inc.
- g. Grinnell Corporation.
- h. Hammond Valve.
- i. Honeywell Braukmann.
- j. Jamesbury, Inc.

B. Copper-Alloy Ball Valves, General: MSS SP-110.

C. Two-Piece, Copper-Alloy Ball Valves: Bronze body with full-port, chrome-plated bronze ball; seats; and 600-psig minimum CWP rating and blowout-proof stem.

2.4 BRONZE CHECK VALVES

A. Manufacturers:

1. Type 1, Bronze, Vertical Lift Check Valves with Metal Disc:

- a. Cincinnati Valve Co.
- b. Crane Co.; Crane Valve Group; Crane Valves.
- c. Crane Co.; Crane Valve Group; Jenkins Valves.
- d. Red-White Valve Corp.

2. Type 3, Bronze, Swing Check Valves with Metal Disc:

- a. American Valve, Inc.
- b. Cincinnati Valve Co.
- c. Crane Co.; Crane Valve Group; Crane Valves.
- d. Crane Co.; Crane Valve Group; Jenkins Valves.
- e. Crane Co.; Crane Valve Group; Stockham Div.
- f. Grinnell Corporation.
- g. Hammond Valve.

B. Bronze Check Valves, General: MSS SP-80.

C. Type 3, Class 125, Bronze, Swing Check Valves: Bronze body with bronze disc and seat.

D. Type 3, Class 150, Bronze, Swing Check Valves: Bronze body with bronze disc and seat.

E. Type 4, Class 125, Bronze, Swing Check Valves: Bronze body with nonmetallic disc and bronze seat.

F. Type 4, Class 150, Bronze, Swing Check Valves: Bronze body with nonmetallic disc and bronze seat.

2.5 GRAY-IRON SWING CHECK VALVES

A. Manufacturers:

1. Type I, Gray-Iron Swing Check Valves with Metal Seats:

- a. Cincinnati Valve Co.
- b. Crane Co.; Crane Valve Group; Crane Valves.
- c. Crane Co.; Crane Valve Group; Jenkins Valves.
- d. Crane Co.; Crane Valve Group; Stockham Div.
- e. Flomatic Valves.
- f. Grinnell Corporation.
- g. Hammond Valve.
- h. Kitz Corporation of America.
- i. Legend Valve & Fitting, Inc.
- j. Milwaukee Valve Company.

2. Type II, Gray-Iron Swing Check Valves with Composition to Metal Seats:

- a. Crane Co.; Crane Valve Group; Crane Valves.
- b. Crane Co.; Crane Valve Group; Stockham Div.
- c. Mueller Co.
- d. Watts Industries, Inc.; Water Products Div.

B. Gray-Iron Swing Check Valves, General: MSS SP-71.

- C. Type I, Class 125, gray-iron, swing check valves with metal seats.
- D. Type II, Class 125, gray-iron, swing check valves with composition to metal seats.

2.6 BRONZE GATE VALVES

A. Manufacturers:

1. Type 1, Bronze, Nonrising-Stem Gate Valves:

- a. American Valve, Inc.
- b. Cincinnati Valve Co.
- c. Crane Co.; Crane Valve Group; Crane Valves.
- d. Crane Co.; Crane Valve Group; Jenkins Valves.
- e. Crane Co.; Crane Valve Group; Stockham Div.
- f. Grinnell Corporation.

B. Bronze Gate Valves, General: MSS SP-80, with ferrous-alloy handwheel.

- C. Type 1, Class 125, Bronze Gate Valves: Bronze body with nonrising stem and bronze solid wedge and union-ring bonnet.
- D. Type 1, Class 150, Bronze Gate Valves: Bronze body with nonrising stem and bronze solid wedge and union-ring bonnet.
- E. Type 2, Class 150, Bronze Gate Valves: Bronze body with rising stem and bronze solid wedge and union-ring bonnet.

2.7 CAST-IRON GATE VALVES

A. Manufacturers:

1. Type I, Cast-Iron, Nonrising-Stem Gate Valves:

- a. Cincinnati Valve Co.
- b. Crane Co.; Crane Valve Group; Crane Valves.
- c. Crane Co.; Crane Valve Group; Jenkins Valves.
- d. Crane Co.; Crane Valve Group; Stockham Div.
- e. Grinnell Corporation.
- f. Hammond Valve.
- g. Kitz Corporation of America.

2. Type I, Cast-Iron, Rising-Stem Gate Valves:

- a. Cincinnati Valve Co.
- b. Crane Co.; Crane Valve Group; Crane Valves.
- c. Crane Co.; Crane Valve Group; Jenkins Valves.

- d. Crane Co.; Crane Valve Group; Stockham Div.
- e. Grinnell Corporation.
- f. Hammond Valve.
- g. Kitz Corporation of America.

B. Cast-Iron Gate Valves, General: MSS SP-70, Type I.

C. Class 125, NRS, Bronze-Mounted, Cast-Iron Gate Valves: Cast-iron body with bronze trim, nonrising stem, and solid-wedge disc.

D. Class 125, OS&Y, Bronze-Mounted, Cast-Iron Gate Valves: Cast-iron body with bronze trim, rising stem, and solid-wedge disc.

2.8 BRONZE GLOBE VALVES

A. Manufacturers:

1. Type 1, Bronze Globe Valves with Metal Disc:

- a. Cincinnati Valve Co.
- b. Crane Co.; Crane Valve Group; Crane Valves.
- c. Crane Co.; Crane Valve Group; Jenkins Valves.
- d. Crane Co.; Crane Valve Group; Stockham Div.
- e. Grinnell Corporation.
- f. Hammond Valve.
- g. Kitz Corporation of America.

2. Type 2, Bronze Globe Valves with Nonmetallic Disc:

- a. Cincinnati Valve Co.
- b. Crane Co.; Crane Valve Group; Crane Valves.
- c. Crane Co.; Crane Valve Group; Jenkins Valves.
- d. Crane Co.; Crane Valve Group; Stockham Div.
- e. Grinnell Corporation.

B. Bronze Globe Valves, General: MSS SP-80, with ferrous-alloy handwheel.

C. Type 1, Class 125, Bronze Globe Valves: Bronze body with bronze disc and union-ring bonnet.

D. Type 1, Class 150, Bronze Globe Valves: Bronze body with bronze disc and union-ring bonnet.

2.9 CAST-IRON GLOBE VALVES

A. Manufacturers:

1. Type I, Cast-Iron Globe Valves with Metal Seats:

- a. Cincinnati Valve Co.
 - b. Crane Co.; Crane Valve Group; Crane Valves.
 - c. Crane Co.; Crane Valve Group; Jenkins Valves.
 - d. Crane Co.; Crane Valve Group; Stockham Div.
 - e. Grinnell Corporation.
 - f. Hammond Valve.
 - g. Kitz Corporation of America.
 - h. Milwaukee Valve Company.
- B. Cast-Iron Globe Valves, General: MSS SP-85.
- C. Type I, Class 125, Cast-Iron Globe Valves: Gray-iron body with bronze seats.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine piping system for compliance with requirements for installation tolerances and other conditions affecting performance.
- 1. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. 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.
- C. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- D. Examine threads on valve and mating pipe for form and cleanliness.
- E. 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.
- F. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE APPLICATIONS

- A. Refer to piping Sections for specific valve applications. If valve applications are not indicated, use the following:
- 1. Shutoff Service: Ball or gate valves.
 - 2. Throttling Service: Angle, ball, or globe valves.

- B. If valves with specified CWP ratings are not available, the same types of valves with higher CWP ratings may be substituted.
- C. Domestic Water Piping: Use the following types of valves:
1. Ball Valves, NPS 2 (DN 50) and Smaller: One-piece, 400-psig CWP rating, copper alloy.
 2. Ball Valves, NPS 2-1/2 (DN 65) and Larger: Class 150, ferrous alloy.
 3. Lift Check Valves, NPS 2 (DN 50) and Smaller: Type 2, Class 125, 150 horizontal or vertical, bronze.
 4. Swing Check Valves, NPS 2 (DN 50) and Smaller: Type 4, Class 125, 150, bronze.
 5. Swing Check Valves, NPS 2-1/2 (DN 65) and Larger: Type II, Class 125, gray iron.
 6. Gate Valves, NPS 2 (DN 50) and Smaller: Type 1, 2, Class 125, 150 bronze.
 7. Gate Valves, NPS 2-1/2 (DN 65) and Larger: Type I, Class 125, bronze-mounted cast iron.
 8. Globe Valves, NPS 2 (DN 50) and Smaller: Type 2, Class 125, 150 bronze.
 9. Globe Valves, NPS 2-1/2 (DN 65) and Larger: Type I, Class 125, bronze-mounted cast iron.
- D. Sanitary Waste and Storm Drainage Piping: Use the following types of valves:
1. Ball Valves, NPS 2 (DN 50) and Smaller: One-piece, 400-psig CWP rating, copper alloy.
 2. Ball Valves, NPS 2-1/2 (DN 65) and Larger: Class 150, ferrous alloy.
 3. Swing Check Valves, NPS 2 (DN 50) and Smaller: Type 3, 4, Class 125, 150 bronze.
 4. Swing Check Valves, NPS 2-1/2 (DN 65) and Larger: Type I or II, Class 125, gray iron.
 5. Gate Valves, NPS 2 (DN 50) and Smaller: Type 1, 2, Class 125, 150 bronze.
 6. Gate Valves, NPS 2-1/2 (DN 65) and Larger: Type I, Class 125, OS&Y, bronze-mounted cast iron.
 7. Globe Valves, NPS 2 (DN 50) and Smaller: Type 1, 2, Class 125, 150 bronze.
 8. Globe Valves, NPS 2-1/2 (DN 65) and Larger: Type I, Class 125, cast iron.
- E. Select valves, except wafer and flangeless types, with the following end connections:
1. For Copper Tubing, NPS 2 (DN 50) and Smaller: Solder-joint or threaded ends.
 2. For Copper Tubing, NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Flanged or threaded ends.
 3. For Copper Tubing, NPS 5 (DN 125) and Larger: Flanged ends.
 4. For Steel Piping, NPS 2 (DN 50) and Smaller: Threaded ends.
 5. For Steel Piping, NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Flanged or threaded ends.

3.3 VALVE INSTALLATION

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- C. Locate valves for easy access and provide separate support where necessary.

- D. Install valves in horizontal piping with stem at or above center of pipe.
- E. Install valves in position to allow full stem movement.
- F. Install check valves for proper direction of flow and as follows:
 - 1. Swing Check Valves: In horizontal position with hinge pin level.
 - 2. Lift Check Valves: With stem upright and plumb.

3.4 JOINT CONSTRUCTION

- A. Refer to Section "Common Work Results for Plumbing" for basic piping joint construction.
- B. Grooved Joints: Assemble joints with keyed coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.
- C. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free-alloy solder; and ASTM B 828 procedure, unless otherwise indicated.

3.5 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.

END OF SECTION 22 05 23

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 220529

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes the following hangers and supports for plumbing system piping and equipment:
 - 1. Steel pipe hangers and supports.
 - 2. Trapeze pipe hangers.
 - 3. Metal framing systems.
 - 4. Thermal-hanger shield inserts.
 - 5. Fastener systems.
 - 6. Pipe stands.
 - 7. Equipment supports.
- B. Related Sections include the following:
 - 1. Section "Expansion Fittings and Loops for Plumbing Piping" for pipe guides and anchors.
 - 2. Section "Vibration and Seismic Controls for Plumbing Piping and Equipment" for vibration isolation devices.

1.3 DEFINITIONS

- A. MSS: Manufacturers Standardization Society for The Valve and Fittings Industry Inc.
- B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.4 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.

- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- C. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.5 SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel pipe hangers and supports.
 - 2. Fiberglass pipe hangers.
 - 3. Thermal-hanger shield inserts.
 - 4. Pipe positioning systems.
- B. Shop Drawings: Signed and sealed by a qualified professional engineer licensed in the State of New York. Show fabrication and installation details and include calculations for the following:
 - 1. Trapeze pipe hangers. Include Product Data for components.
 - 2. Metal framing systems. Include Product Data for components.
 - 3. Pipe stands. Include Product Data for components.
 - 4. Equipment supports.
- C. Welding certificates.

1.6 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel.", AWS D1.4, "Structural Welding Code--Reinforcing Steel."
- B. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code--Steel."
 - 2. AWS D1.4, "Structural Welding Code--Reinforcing Steel."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified, or approved equal.

2.2 STEEL PIPE HANGERS AND SUPPORTS

- A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.
- B. Manufacturers:
 - 1. AAA Technology & Specialties Co., Inc.
 - 2. Globe Pipe Hanger Products, Inc.
 - 3. Grinnell Corp.
 - 4. National Pipe Hanger Corporation.
 - 5. PHD Manufacturing, Inc.
- C. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.
- D. Nonmetallic Coatings: Plastic coating, jacket, or liner.
- E. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.3 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

2.4 METAL FRAMING SYSTEMS

- A. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components.
- B. Manufacturers:
 - 1. B-Line Systems, Inc.; a division of Cooper Industries.
 - 2. ERICO/Michigan Hanger Co.; ERISTRUT Div.
 - 3. GS Metals Corp.
 - 4. Power-Strut Div.; Tyco International, Ltd.
- C. Coatings: Manufacturer's standard finish unless bare metal surfaces are indicated.
- D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

2.5 THERMAL-HANGER SHIELD INSERTS

- A. Description: 100-psig- minimum, compressive-strength insulation insert encased in sheet metal shield.

B. Manufacturers:

1. Carpenter & Paterson, Inc.
2. ERICO/Michigan Hanger Co.
3. PHS Industries, Inc.
4. Pipe Shields, Inc.

C. Insulation-Insert Material for Cold Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with vapor barrier.

D. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate.

E. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

F. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

G. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.6 FASTENER SYSTEMS

A. Mechanical-Expansion Anchors: Insert-wedge-type zinc-coated steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers:

- a. B-Line Systems, Inc.; a division of Cooper Industries.
- b. Empire Industries, Inc.
- c. Hilti, Inc.
- d. ITW Ramset/Red Head.

2.7 PIPE STAND FABRICATION

A. Pipe Stands, General: Shop or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

B. Compact Pipe Stand: One-piece plastic unit with integral-rod-roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.

1. Manufacturers:

- a. ERICO/Michigan Hanger Co.
- b. MIRO Industries.
- c. Portable Pipe Hangers.

- C. Low-Type, Single-Pipe Stand: One-piece stainless-steel base unit with plastic roller, for roof installation without membrane penetration.
1. Manufacturers:
 - a. ERICO/Michigan Hanger Co.
 - b. MIRO Industries.
 - c. Portable Pipe Hangers.
- D. High-Type, Single-Pipe Stand: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
1. Manufacturers:
 - a. ERICO/Michigan Hanger Co.
 - b. MIRO Industries.
 - c. Portable Pipe Hangers.
 2. Base: Stainless steel.
 3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
 4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.
- E. High-Type, Multiple-Pipe Stand: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
1. Bases: One or more plastic.
 2. Vertical Members: Two or more protective-coated-steel channels.
 3. Horizontal Member: Protective-coated-steel channel.
 4. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.
- F. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe support made from structural-steel shape, continuous-thread rods, and rollers for mounting on permanent stationary roof curb.

2.8 PIPE POSITIONING SYSTEMS

- A. Description: IAPMO PS 42, system of metal brackets, clips, and straps for positioning piping in pipe spaces for plumbing fixtures for commercial applications.
- B. Manufacturers:
1. C & S Mfg. Corp.
 2. HOLDRITE Corp.; Hubbard Enterprises.
 3. Samco Stamping, Inc.

2.9 EQUIPMENT SUPPORTS

- A. Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.

2.10 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C 1107, 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 HANGER AND SUPPORT APPLICATIONS

- A. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 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 padded hangers for piping that is subject to scratching.
- F. 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 (DN 15 to DN 750).
 - 2. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4 (DN 15 to DN 100), to allow off-center closure for hanger installation before pipe erection.
 - 3. Pipe Saddle Supports (MSS Type 36): For support of pipes, NPS 4 to NPS 36 (DN 100 to DN 900), with steel pipe base stanchion support and cast-iron floor flange.
 - 4. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes, NPS 2-1/2 to NPS 20 (DN 65 to DN 500), from single rod if horizontal movement caused by expansion and contraction might occur.

- G. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20 (DN 20 to DN 500), if longer ends are required for riser clamps.
- H. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
- I. Building Attachments: 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. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 3. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
 4. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
- J. Saddles and Shields: 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.
 3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- K. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.
- L. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.
- M. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

3.2 HANGER AND SUPPORT INSTALLATION

- A. Steel Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.
- B. Trapeze Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. 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 above for individual pipe hangers.
 2. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.
- C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.
- D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- E. Fastener System Installation:
1. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- F. Pipe Stand Installation:
1. Pipe Stand Types except Curb-Mounting Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
 2. Curb-Mounting-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb.
- G. Pipe Positioning System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture.
- H. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- I. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- J. 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.
- K. Install lateral bracing with pipe hangers and supports to prevent swaying.
- L. 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 (DN 65) 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.
- M. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- N. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.9 (for building services piping) are not exceeded.
- O. Insulated Piping: Comply with the following:

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 according to 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.
3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
4. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.
 - b. NPS 4 (DN 100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.
 - c. NPS 5 and NPS 6 (DN 125 and DN 150): 18 inches (457 mm) long and 0.06 inch (1.52 mm) thick.
 - d. NPS 8 to NPS 14 (DN 200 to DN 350): 24 inches (610 mm) long and 0.075 inch (1.91 mm) thick.
5. Pipes NPS 8 (DN 200) and Larger: Include wood inserts.
6. Insert Material: Length at least as long as protective shield.
7. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.3 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make smooth bearing surface.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

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 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 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. Touch Up: 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.
 - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.
- B. Touch Up: Clean and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 22 05 29

SECTION 220548

VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Isolation mounts.
 - 2. Restrained elastomeric isolation mounts.
 - 3. Freestanding spring isolators.
 - 4. Housed spring mounts.
 - 5. Elastomeric hangers.
 - 6. Spring hangers.
 - 7. Spring hangers with vertical-limit stops.
 - 8. Pipe riser resilient supports.
 - 9. Resilient pipe guides.
 - 10. Seismic snubbers.
 - 11. Restraining braces and cables.

1.3 DEFINITIONS

- A. IBC: International Building Code.
- B. ICC-ES: ICC-Evaluation Service.
- C. OSHPD: Office of Statewide Health Planning and Development for the State of California.

1.4 PERFORMANCE REQUIREMENTS

- A. Seismic-Restraint Loading:
 - 1. Site Class as Defined in the IBC.
 - 2. Assigned Seismic Use Group or Building Category as Defined in the IBC.

1.5 SUBMITTALS

A. Product Data: For the following:

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 seismic-restraint component used.
 - a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an agency acceptable to authorities having jurisdiction.
 - b. Annotate to indicate application of each product submitted and compliance with requirements.
3. Interlocking Snubbers: Include ratings for horizontal, vertical, and combined loads.

B. Delegated-Design Submittal: For vibration isolation and seismic-restraint details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer licensed in the State of New York responsible for their preparation.

1. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, seismic forces required to select vibration isolators, and seismic restraints.
2. Riser Supports: Include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on building structure, spring deflection changes, and seismic loads. Include certification that riser system has been examined for excessive stress and that none will exist.
3. Vibration Isolation Base Details: Detail overall dimensions, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, base weights, equipment static loads, power transmission, component misalignment, and cantilever loads.
4. Seismic-Restraint Details:
 - 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 the 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. Preapproval and Evaluation Documentation: By an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

- C. Coordination Drawings: Show coordination of seismic bracing for plumbing piping and equipment with other systems and equipment in the vicinity, including other supports and seismic restraints.
- D. Welding certificates.
- E. Qualification Data: For professional engineer licensed in the State of New York and testing agency.
- F. Field quality-control test reports.
- G. Operation and Maintenance Data: For air-mounting systems to include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
- B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
- C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- D. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproved by ICC-ES, or preapproved by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer licensed in the State of New York.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - 1. Ace Mountings Co., Inc.
 - 2. Amber/Booth Company, Inc.
 - 3. California Dynamics Corporation.

4. Isolation Technology, Inc.
 5. Kinetics Noise Control.
 6. Mason Industries.
 7. Vibration Eliminator Co., Inc.
 8. Vibration Isolation.
 9. Vibration Mountings & Controls, Inc.
- B. Mounts: Double-deflection type, with molded, oil-resistant rubber, hermetically sealed compressed fiberglass, or neoprene isolator elements with factory-drilled, encapsulated top plate for bolting to equipment and with baseplate for bolting to structure. Color-code or otherwise identify to indicate capacity range.
1. Materials: Cast-ductile-iron or welded steel housing containing two separate and opposing, oil-resistant rubber or neoprene elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
 2. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.
- C. Restrained Mounts: All-directional mountings with seismic restraint.
1. Materials: Cast-ductile-iron or welded steel housing containing two separate and opposing, oil-resistant rubber or neoprene elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
 2. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.
- D. Spring Isolators: Freestanding, laterally stable, open-spring isolators.
1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 5. Baseplates: Factory drilled for bolting to structure and bonded to 1/4-inch- thick, rubber isolator pad attached to baseplate underside. Baseplates shall limit floor load to 500 psig.
 6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.
- E. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic or limit-stop restraint.
1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to weight being removed; factory-drilled baseplate bonded to 1/4-inch- thick, neoprene or rubber isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
 2. Restraint: Seismic or limit-stop as required for equipment and authorities having jurisdiction.

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.
- F. Housed Spring Mounts: Housed spring isolator with integral seismic snubbers.
1. Housing: Ductile-iron or steel housing to provide all-directional seismic restraint.
 2. Base: Factory drilled for bolting to structure.
 3. Snubbers: Vertically adjustable to allow a maximum of 1/4-inch travel up or down before contacting a resilient collar.
- G. Elastomeric Hangers: Single or double-deflection type, fitted with molded, oil-resistant elastomeric isolator elements bonded to steel housings with threaded connections for hanger rods. Color-code or otherwise identify to indicate capacity range.
- H. Spring Hangers: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression.
1. 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.
 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. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
 7. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.
- I. Spring Hangers with Vertical-Limit Stop: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression and with a vertical-limit stop.
1. 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.
 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. Elastomeric Element: Molded, oil-resistant rubber or neoprene.

7. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
 8. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.
- J. Pipe Riser Resilient Support: All-directional, acoustical pipe anchor consisting of 2 steel tubes separated by a minimum of 1/2-inch- thick neoprene. Include steel and neoprene vertical-limit stops arranged to prevent vertical travel in both directions. Design support for a maximum load on the isolation material of 500 psig and for equal resistance in all directions.
- K. Resilient Pipe Guides: Telescopic arrangement of 2 steel tubes or post and sleeve arrangement separated by a minimum of 1/2-inch- thick neoprene. Where clearances are not readily visible, a factory-set guide height with a shear pin to allow vertical motion due to pipe expansion and contraction shall be fitted. Shear pin shall be removable and reinsertable to allow for selection of pipe movement. Guides shall be capable of motion to meet location requirements.

2.2 SEISMIC-RESTRAINT DEVICES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
1. Amber/Booth Company, Inc.
 2. California Dynamics Corporation.
 3. Cooper B-Line, Inc.; a division of Cooper Industries.
 4. Hilti, Inc.
 5. Kinetics Noise Control.
 6. Loos & Co.; Cableware Division.
 7. Mason Industries.
 8. TOLCO Incorporated; a brand of NIBCO INC.
 9. Unistrut; Tyco International, Ltd.
- B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to authorities having jurisdiction.
1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.
- C. Snubbers: Factory fabricated using welded structural-steel shapes and plates, anchor bolts, and replaceable resilient isolation washers and bushings.
1. Anchor bolts for attaching to concrete shall be seismic-rated, drill-in, and stud-wedge or female-wedge type.
 2. Resilient Isolation Washers and Bushings: Oil- and water-resistant neoprene.
 3. Maximum 1/4-inch air gap, and minimum 1/4-inch- thick resilient cushion.

- D. Channel Support System: MFMA-3, shop- or field-fabricated support assembly made of slotted steel channels with 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; and rated in tension, compression, and torsion forces.
- E. Restraint Cables: ASTM A 603 galvanized-steel cables with end connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement.
- F. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod.
- G. 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.
- H. 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.
- I. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.
- J. Mechanical Anchor Bolts: 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 required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.
- K. Adhesive Anchor Bolts: Drilled-in and capsule anchor system containing polyvinyl 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 E 488.

2.3 FACTORY FINISHES

- A. Finish: Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.
 - 1. Powder coating on springs and housings.
 - 2. All hardware shall be galvanized. Hot-dip galvanize metal components for exterior use.
 - 3. Baked enamel or powder coat for metal components on isolators for interior use.
 - 4. Color-code or otherwise mark vibration isolation and seismic-control devices to indicate capacity range.

PART 3 - EXECUTION

3.1 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.
- 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.

3.2 APPLICATIONS

- A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction.
- B. Hanger Rod Stiffeners: Install hanger rod stiffeners 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 will be adequate to carry present and future static and seismic loads within specified loading limits.

3.3 VIBRATION-CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

- A. Equipment Restraints:
 - 1. Install seismic snubbers on plumbing 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 inches.
 - 3. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.
- B. Piping Restraints:
 - 1. Comply with requirements in MSS SP-127.
 - 2. Space lateral supports a maximum of 40 feet o.c., and longitudinal supports a maximum of 80 feet o.c.
 - 3. Brace a change of direction longer than 12 feet.
- C. Install cables so they do not bend across edges of adjacent equipment or building structure.

- D. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.
- E. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.
- F. 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.
- 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. Drilled-in 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 structural professional engineer licensed in the State of New York 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 Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
 - 4. Adhesive Anchors: 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.

3.4 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

- A. Install flexible connections in piping where they cross seismic joints, 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 "Domestic Water Piping" for piping flexible connections.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.

C. Tests and Inspections:

1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
2. Schedule test with City of New York, through 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 least 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.
9. Air-Mounting System Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
10. Air-Mounting System Operational Test: Test the compressed-air leveling system.
11. Test and adjust air-mounting system controls and safeties.
12. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.

D. Remove and replace malfunctioning units and retest as specified above.

E. Prepare test and inspection reports.

3.6 ADJUSTING

- A. Adjust isolators after piping 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.
- C. Adjust active height of sprint isolators.
- D. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION 22 05 48

SECTION 220553

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Equipment labels.
 - 2. Pipe labels.
 - 3. Valve tags.

1.3 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 to include in maintenance manuals.

1.4 COORDINATION

- 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.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
2. Letter Color: White.
3. Background Color: Black.
4. Maximum Temperature: Able to withstand temperatures 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 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.

B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to partially cover circumference of pipe and to attach to pipe without fasteners or adhesive.

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, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches high.

2.3 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.
 - 1. Tag Material: Aluminum, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
 - 2. Fasteners: Brass wire-link or beaded chain; or S-hook.
- 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. Valve-tag schedule shall be included in operation and maintenance data.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

- A. Piping Color-Coding: Painting of piping is specified in general sections.
- B. 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. Near each valve and control device.
 - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 - 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 - 4. At access doors, manholes, and similar access points that permit view of concealed piping.

5. Near major equipment items and other points of origination and termination.
 6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
 7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
- C. Pipe Label Color Schedule:
1. Domestic Water Piping:
 - a. Background Color: Black.
 - b. Letter Color: White.
 2. Sanitary Waste and Storm Drainage Piping:
 - a. Background Color: Black.
 - b. Letter Color: White.

3.4 VALVE-TAG INSTALLATION

- 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.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
1. Valve-Tag Size and Shape:
 - a. Cold Water: 1-1/2 inches, 2 inches, round.
 - b. Hot Water: 1-1/2 inches, 2 inches round.
 2. Valve-Tag Color:
 - a. Cold Water: Natural.
 - b. Hot Water: Natural.
 3. Letter Color:
 - a. Cold Water: Black.
 - b. Hot Water: Black.

END OF SECTION 22 05 53

SECTION 220700

PLUMBING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Insulation Materials:
 - a. Cellular glass.
 - b. Mineral fiber.
 - 2. Insulating cements.
 - 3. Adhesives.
 - 4. Factory-applied jackets.
 - 5. Field-applied jackets.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).
- B. Shop Drawings:
 - 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.
 - 8. Detail field application for each equipment type.

- C. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use. Sample sizes are as follows:

1. Sample Sizes:

- a. Preformed Pipe Insulation Materials: 12 inches long by NPS 2.
- b. Sheet Form Insulation Materials: 12 inches square.
- c. Jacket Materials for Pipe: 12 inches long by NPS 2.
- d. Sheet Jacket Materials: 12 inches square.
- e. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

- D. Qualification Data: For qualified Installer.

- E. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction 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.

- F. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.
1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.6 COORDINATION

- A. Coordinate size and location of supports, hangers, and insulation shields specified in Section "Hangers and Supports."

- B. Coordinate clearance requirements with piping Installer for piping insulation application and equipment Installer for equipment 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.

1.7 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.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Cell-U-Foam Corporation; Ultra-CUF.
 - b. Pittsburgh Corning Corporation; Foamglas Super K.
 - c. Knauf Insulation
 - 2. Block Insulation: ASTM C 552, Type I.
 - 3. Special-Shaped Insulation: ASTM C 552, Type III.
 - 4. Board Insulation: ASTM C 552, Type IV.
 - 5. Preformed Pipe Insulation without Jacket: Comply with ASTM C 552, Type II, Class 1.

6. Preformed Pipe Insulation with Factory-Applied ASJ: Comply with ASTM C 552, Type II, Class 2.
 7. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
- G. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type I. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. CertainTeed Corp.; Duct Wrap.
 - b. Johns Manville; Microlite.
 - c. Knauf Insulation; Duct Wrap.
 - d. Manson Insulation Inc.; Alley Wrap.
 - e. Owens Corning; All-Service Duct Wrap.
- H. Mineral-Fiber, Preformed Pipe Insulation:
1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Fibrex Insulations Inc.; Coreplus 1200.
 - b. Johns Manville; Micro-Lok.
 - c. Knauf Insulation; 1000(Pipe Insulation.
 - d. Manson Insulation Inc.; Alley-K.
 - e. Owens Corning; Fiberglas Pipe Insulation.
 2. Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
- I. Mineral-Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semirigid board material with factory-applied FSK jacket complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB. Nominal density is 2.5 lb/cu. ft. or more. Thermal conductivity (k-value) at 100 deg F is 0.29 Btu x in./h x sq. ft. x deg F or less. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. CertainTeed Corp.; CrimpWrap.
 - b. Johns Manville; MicroFlex.
 - c. Knauf Insulation; Pipe and Tank Insulation.
 - d. Manson Insulation Inc.; AK Flex.
 - e. Owens Corning; Fiberglas Pipe and Tank Insulation.

2.2 INSULATING CEMENTS

A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.

1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Insulco, Division of MFS, Inc.; SmoothKote.
 - b. P. K. Insulation Mfg. Co., Inc.; PK No. 127, and Quik-Cote.
 - c. Rock Wool Manufacturing Company; Delta One Shot.

B. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.

1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Insulco, Division of MFS, Inc.; SmoothKote.
 - b. P. K. Insulation Mfg. Co., Inc.; PK No. 127, and Quik-Cote.
 - c. Rock Wool Manufacturing Company; Delta One Shot.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Childers Products, Division of ITW; CP-82.
 - b. Foster Products Corporation, H. B. Fuller Company; 85-20.
 - c. ITW TACC, Division of Illinois Tool Works; S-90/80.
 - d. Marathon Industries, Inc.; 225.
 - e. Mon-Eco Industries, Inc.; 22-25.

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.

B. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.

1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:

- a. Childers Products, Division of ITW; CP-35.
 - b. Foster Products Corporation, H. B. Fuller Company; 30-90.
 - c. ITW TACC, Division of Illinois Tool Works; CB-50.
 - d. Marathon Industries, Inc.; 590.
 - e. Mon-Eco Industries, Inc.; 55-40.
2. Water-Vapor Permeance: ASTM E 96, Procedure B, 0.013 perm at 43-mil dry film thickness.
 3. Service Temperature Range: Minus 20 to plus 180 deg F.
 4. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.
 5. Color: White.
- C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below ambient services.
1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Childers Products, Division of ITW; CP-30.
 - b. Foster Products Corporation, H. B. Fuller Company; 30-35.
 - c. ITW TACC, Division of Illinois Tool Works; CB-25.
 - d. Marathon Industries, Inc.; 501.
 - e. Mon-Eco Industries, Inc.; 55-10.
 2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 35-mil dry film thickness.
 3. Service Temperature Range: 0 to 180 deg F.
 4. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
 5. Color: White.
- D. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below ambient services.
1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Childers Products, Division of ITW; Encacel.
 - b. Foster Products Corporation, H. B. Fuller Company; 60-95/60-96.
 - c. Marathon Industries, Inc.; 570.
 - d. Mon-Eco Industries, Inc.; 55-70.
 2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
 3. Service Temperature Range: Minus 50 to plus 220 deg F.
 4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
 5. Color: White.
- E. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Childers Products, Division of ITW; CP-10.
 - b. Foster Products Corporation, H. B. Fuller Company; 35-00.

- c. ITW TACC, Division of Illinois Tool Works; CB-05/15.
 - d. Marathon Industries, Inc.; 550.
 - e. Mon-Eco Industries, Inc.; 55-50.
- 2. Water-Vapor Permeance: ASTM F 1249, 3 perms at 0.0625-inch dry film thickness.
 - 3. Service Temperature Range: Minus 20 to plus 200 deg F.
 - 4. Solids Content: 63 percent by volume and 73 percent by weight.
 - 5. Color: White.

2.5 LAGGING ADHESIVES

- A. Description: Comply with MIL-A-3316C Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.
 - 1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Childers Products, Division of ITW; CP-52.
 - b. Foster Products Corporation, H. B. Fuller Company; 81-42.
 - c. Marathon Industries, Inc.; 130.
 - d. Mon-Eco Industries, Inc.; 11-30.
 - 2. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over equipment and pipe insulation.
 - 3. Service Temperature Range: Minus 50 to plus 180 deg F.
 - 4. Color: White.

2.6 SEALANTS

- A. Joint Sealants:
 - 1. Joint Sealants for Cellular-Glass, Phenolic, and Polyisocyanurate Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Childers Products, Division of ITW; CP-76.
 - b. Foster Products Corporation, H. B. Fuller Company; 30-45.
 - c. Marathon Industries, Inc.; 405.
 - d. Mon-Eco Industries, Inc.; 44-05.
 - e. Pittsburgh Corning Corporation; Pittseal 444.
 - f. Vimasco Corporation; 750.
- B. FSK and Metal Jacket Flashing Sealants:
 - 1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Childers Products, Division of ITW; CP-76-8.
 - b. Foster Products Corporation, H. B. Fuller Company; 95-44.

- c. Marathon Industries, Inc.; 405.
 - d. Mon-Eco Industries, Inc.; 44-05.
- 2. Materials shall be compatible with insulation materials, jackets, and substrates.
 - 3. Fire- and water-resistant, flexible, elastomeric sealant.
 - 4. Service Temperature Range: Minus 40 to plus 250 deg F.
 - 5. Color: Aluminum.

2.7 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 C 1136, Type I.
 - 2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
 - 3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
 - 4. PVDC Jacket for Indoor Applications: 4-mil- thick, white PVDC biaxially oriented barrier film with a permeance at 0.02 perms when tested according to ASTM E 96 and with a flame-spread index of 5 and a smoke-developed index of 20 when tested according to ASTM E 84.
 - 5. PVDC-SSL Jacket: PVDC jacket with a self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip.

2.8 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, 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. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Johns Manville; Zeston.
 - b. P.I.C. Plastics, Inc.; FG Series.
 - c. Proto PVC Corporation; LoSmoke.
 - d. Speedline Corporation; SmokeSafe.
 - 2. Adhesive: As recommended by jacket material manufacturer.
 - 3. Color: Color-code jackets based on system.
 - 4. 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.

5. Factory-fabricated tank heads and tank side panels.

C. Metal Jacket:

1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:

- a. Childers Products, Division of ITW; Metal Jacketing Systems.
- b. PABCO Metals Corporation; Surefit.
- c. RPR Products, Inc.; Insul-Mate.

2. Aluminum Jacket: Comply with ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105 or 5005, Temper H-14.

- a. Factory cut and rolled to size.
- b. Finish and thickness are indicated in field-applied jacket schedules.
- c. Moisture Barrier for Indoor Applications: 1-mil- thick, heat-bonded polyethylene and kraft paper.
- d. Moisture Barrier for Outdoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper 2.5-mil- thick Polysurlyn.
- e. Factory-Fabricated Fitting Covers:
 - 1) Same material, finish, and thickness as jacket.
 - 2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
 - 3) Tee covers.
 - 4) Flange and union covers.
 - 5) End caps.
 - 6) Beveled collars.
 - 7) Valve covers.
 - 8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

- D. Underground Direct-Buried Jacket: 125-mil- thick vapor barrier and waterproofing membrane consisting of a rubberized bituminous resin reinforced with a woven-glass fiber or polyester scrim and laminated aluminum foil.

2.9 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:

- a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0835.
 - b. Compac Corp.; 104 and 105.
 - c. Ideal Tape Co., Inc., an American Biltrite Company; 428 AWF ASJ.
 - d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
2. Width: 3 inches.
 3. Thickness: 11.5 mils.
 4. Adhesion: 90 ounces force/inch in width.
 5. Elongation: 2 percent.
 6. Tensile Strength: 40 lbf/inch in width.
 7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
 - b. Compac Corp.; 110 and 111.
 - c. Ideal Tape Co., Inc., an American Biltrite Company; 491 AWF FSK.
 - d. Venture Tape; 1525 CW, 1528 CW, and 1528 CW/SQ.
 2. Width: 3 inches.
 3. Thickness: 6.5 mils.
 4. Adhesion: 90 ounces force/inch in width.
 5. Elongation: 2 percent.
 6. Tensile Strength: 40 lbf/inch in width.
 7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

2.10 SECUREMENTS

A. Bands:

1. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - a. Childers Products; Bands.
 - b. PABCO Metals Corporation; Bands.
 - c. RPR Products, Inc.; Bands.
2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304; 0.015 inch thick, 1/2 inch wide with wing or closed seal.
3. Aluminum: ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 3/4 inch wide with wing or closed seal.
4. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.

B. Insulation Pins and Hangers:

1. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
 - a. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - 1) AGM Industries, Inc.; Tactoo Insul-Hangers, Series T.
 - 2) GEMCO; Perforated Base.
 - 3) Midwest Fasteners, Inc.; Spindle.
 - b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
 - c. Spindle: Stainless steel, fully annealed, 0.106-inch- diameter shank, length to suit depth of insulation indicated.
 - d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
 2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick, galvanized-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
 - a. Products: Subject to compliance with requirements, provide one of the following, or approved equal:
 - 1) AGM Industries, Inc.; RC-150.
 - 2) GEMCO; R-150.
 - 3) Midwest Fasteners, Inc.; WA-150.
 - 4) Nelson Stud Welding; Speed Clips.
 - b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.
 3. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
- C. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.
- D. Wire: 0.080-inch nickel-copper alloy soft-annealed, stainless steel.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
 - a. C & F Wire.
 - b. Childers Products.
 - c. PABCO Metals Corporation.
 - d. RPR Products, Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
 - 1. Verify that systems and equipment to be insulated have been tested and are free of defects.
 - 2. Verify that surfaces to be insulated are clean and dry.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment and piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment and 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, soften, or otherwise attack insulation or jacket in either wet or dry state.
- 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. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- 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 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.
 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.
 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, 4 inches o.c.
 - a. For below ambient services, apply vapor-barrier mastic over staples.
 4. Cover joints and seams with tape as recommended by insulation material manufacturer 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 more than 75 percent of its nominal thickness.
- 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 similar 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. Manholes.
 5. Handholes.

6. Cleanouts.

3.4 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
 - 1. Seal penetrations with flashing sealant.
 - 2. 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.
 - 3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
 - 4. Seal jacket to roof flashing with flashing sealant.
- 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. Seal penetrations with flashing sealant.
 - 2. 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.
 - 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
 - 4. Seal jacket to wall flashing with flashing sealant.
- 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.
- F. Insulation Installation at Floor Penetrations:
 - 1. Pipe: Install insulation continuously through floor penetrations.
 - 2. Seal penetrations through fire-rated assemblies.

3.5 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.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be 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 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 used for adjacent pipe. Overlap adjoining pipe insulation by not less than two 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 two 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 and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 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. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. 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 shall conform 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 adjoining pipe insulation.
 2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two 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.

3.6 CALCIUM SILICATE INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure single-layer insulation with stainless-steel bands at 12-inch intervals and tighten bands without deforming insulation materials.
2. Install 2-layer insulation with joints tightly butted and staggered at least 3 inches. Secure inner layer with wire spaced at 12-inch intervals. Secure outer layer with stainless-steel bands at 12-inch intervals.
3. Apply a skim coat of mineral-fiber, hydraulic-setting cement to insulation surface. When cement is dry, apply flood coat of lagging adhesive and press on one layer of glass cloth or tape. Overlap edges at least 1 inch. Apply finish coat of lagging adhesive over glass cloth or tape. Thin finish coat to achieve smooth, uniform finish.

B. Insulation Installation on Pipe Flanges:

1. Install preformed 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 block insulation of same material and thickness as pipe insulation.
4. Finish flange insulation same as pipe insulation.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When preformed insulation sections of insulation are not available, install mitered sections of calcium silicate insulation. Secure insulation materials with wire or bands.
3. Finish fittings insulation same as pipe insulation.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install mitered segments of calcium silicate insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
2. Install insulation to flanges as specified for flange insulation application.
3. Finish valve and specialty insulation same as pipe insulation.

3.7 CELLULAR-GLASS INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of 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 factory-applied jackets on above ambient services, secure laps with outward clinched staples at 6 inches o.c.
4. For insulation with factory-applied jackets on below ambient services, do not staple longitudinal tabs but 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 Flanges:

1. Install preformed 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 cellular-glass block insulation of same thickness as pipe insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of cellular-glass insulation to valve body.
2. 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.

3.8 MINERAL-FIBER INSULATION INSTALLATION

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 factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.

4. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but 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 Flanges:

1. Install preformed 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 mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as 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.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered 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 FIELD-APPLIED JACKET INSTALLATION

A. Where FSK/ASJ 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 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 FINISHES

- A. Equipment and Pipe Insulation with FSK/ASJ or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in painting Sections.
 - 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. 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 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
 - 1. Inspect field-insulated equipment, randomly selected by Commissioner, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each type of equipment. For large equipment, remove only a portion adequate to determine compliance.
 - 2. Inspect pipe, fittings, strainers, and valves, randomly selected by Commissioner, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.
- D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.12 PIPING INSULATION SCHEDULE, GENERAL

- A. 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.
- B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 - 1. Drainage piping located in crawl spaces.
 - 2. Underground piping.

3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.13 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Cold Water:

1. NPS 1 (DN 25) and Smaller: Insulation shall be:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
2. NPS 1-1/4 (DN 32) and Larger: Insulation shall be:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1-1/2 inches thick.

B. Domestic Hot Water:

1. NPS 1-1/4 (DN 32) and Smaller: Insulation shall be:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1-1/2 inches thick.
2. NPS 1-1/2 (DN 40) and Larger: Insulation shall be:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 2 inch thick.

C. Stormwater and Overflow:

1. All Pipe Sizes: Insulation shall be:
 - a. Cellular Glass: 1-1/2 inches thick.

D. Roof Drain and Overflow Drain Bodies:

1. All Pipe Sizes: Insulation shall be:
 - a. Cellular Glass: 1-1/2 inches thick.

E. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities:

1. All Pipe Sizes: Insulation shall be:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

F. Condensate and Equipment Drain Water below 60 Deg F:

1. All Pipe Sizes: Insulation shall be:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

G. Floor Drains, Traps, and Sanitary Drain Piping within 10 Feet of Drain Receiving Condensate and Equipment Drain Water below 60 Deg F:

1. All Pipe Sizes: Insulation shall be:
 - a. Cellular Glass: 1-1/2 inches thick.

H. Hot Service Drains:

1. All Pipe Sizes: Insulation shall be:
 - a. Mineral-Fiber, Preformed Pipe, Type I or II: 1-1/2 inches thick.

I. Hot Service Vents:

1. All Pipe Sizes: Insulation shall be:
 - a. Mineral-Fiber, Preformed Pipe, Type I or II: 1-1/2 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.
- B. If more than one material is listed, selection from materials listed is Contractor's option.
- C. Equipment, Concealed:
 1. None.
- D. Equipment, Exposed, up to 48 Inches in Diameter or with Flat Surfaces up to 72 Inches:
 1. Stainless Steel, Type 304: 0.020 inch thick.
- E. Equipment, Exposed, Larger Than 48 Inches in Diameter or with Flat Surfaces Larger Than 72 Inches:
 1. None.
- F. Piping, Concealed:
 1. Painted Aluminum, Smooth 0.020 inch thick.
- G. Piping, Exposed:
 1. Painted Aluminum, Smooth 0.020 inch thick.
 2. Stainless Steel, Type 304 thick.

3.15 UNDERGROUND, FIELD-INSTALLED INSULATION JACKET

- A. For underground direct-buried piping applications, install underground direct-buried jacket over insulation material.

END OF SECTION 22 07 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 221116

DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. Water meters will be furnished and installed by plumbing contractor in coordination with the requirements of the local utility company.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide components and installation capable of producing domestic water piping systems with 125 psig, unless otherwise indicated.

1.4 SUBMITTALS

- A. Product Data: For pipe, tube, fittings, and couplings.
- B. Water Samples: Specified in Part 3 "Cleaning" Article.
- C. Field quality-control test reports.

1.5 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 PIPING MATERIALS

- A. Refer to Part 3 "Pipe and Fitting Applications" Article for applications of pipe, tube, fitting, and joining materials.
- B. Transition Couplings for Aboveground Pressure Piping: Coupling or other manufactured fitting the same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.

2.3 COPPER TUBE AND FITTINGS

- A. Hard Copper Tube: ASTM B 88, Types L and M (ASTM B 88M, Types B and C), water tube, drawn temper.
 1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
 2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends. Furnish Class 300 flanges if required to match piping.
 3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.
 4. Copper, Grooved-End Fittings: ASTM B 75 (ASTM B 75M) copper tube or ASTM B 584 bronze castings.
 - a. Grooved-End-Tube Couplings: Copper-tube dimensions and design similar to AWWA C606. Include ferrous housing sections, gasket suitable for hot water, and bolts and nuts.

PART 3 - EXECUTION

3.1 EXCAVATION

- A. Excavating, trenching, and backfilling are specified.

3.2 PIPE AND FITTING 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 may be used on aboveground piping, unless otherwise indicated.
- C. Grooved joints may be used on aboveground grooved-end piping.

- D. Under-Building-Slab, Domestic Water Piping on service side of the of Water Meter, NPS 4 (DN 100) and Smaller: Hard copper tube, Type L (Type B) and brazed joints. Coordinate requirements with water service utility.
- E. Under-Building-Slab, Domestic Water Piping on House Side of Water Meter, NPS 4 (DN 100) and Smaller: Hard copper tube, Type L (Type B) and soldered joints.
- F. Aboveground Domestic Water Piping: Use the following piping materials for each size range:
 - 1. NPS 1 (DN 25) and Smaller: Hard copper tube, Type L (Type B) and soldered joints.
 - 2. NPS 1-1/4 and NPS 1-1/2 (DN 32 and DN 40): Hard copper tube, Type L (Type B) and soldered joints.

3.3 VALVE APPLICATIONS

- A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - 1. Shutoff Duty: Use bronze ball or gate valves for piping NPS 2 (DN 50) and smaller.
 - 2. Throttling Duty: Use bronze ball or globe valves for piping NPS 2 (DN 50) and smaller.
Hot-Water-Piping, Balancing Duty: Calibrated balancing valves.
 - 3. Drain Duty: Hose-end drain valves.
- B. Cast-iron, grooved-end valves may be used with grooved-end piping.
- C. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball or gate valves for piping NPS 2 (DN 50) and smaller. NPS 1/2 or NPS 3/4 (DN 15 or DN 20) inlet, hose-end drain valves may be adequate for this application.
- D. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping.
 - 1. Install hose-end drain valves at low points in water mains, risers, and branches.
 - 2. Install stop-and-waste drain valves where indicated.

3.4 PIPING INSTALLATION

- A. Install under-building-slab copper tubing according to CDA's "Copper Tube Handbook."
- B. Install stainless steel sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight.
- C. Install wall penetration system at each service pipe penetration through foundation wall. Make installation watertight.

- D. Install domestic water piping level with 0.25 percent slope downward toward drain and plumb.
- E. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

3.5 JOINT CONSTRUCTION

- A. Soldered Joints: Use ASTM B 813, water-flushable, lead-free flux; ASTM B 32, lead-free alloy solder; and ASTM B 828 procedure, unless otherwise indicated.
- B. Extruded-Tee Connections: Form tee in copper tube according to ASTM F 2144. 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.

3.6 HANGER AND SUPPORT INSTALLATION

- A. Seismic-restraint devices are specified in Section "Mechanical Vibration and Seismic Controls."
- B. Pipe hanger and support devices are specified in Section "Hangers and Supports." Install the following:
 - 1. Vertical Piping: MSS Type 8 or Type 42, clamps.
 - 2. Individual, Straight, Horizontal Piping Runs: According to the following:
 - 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: MSS Type 49, spring cushion rolls, if indicated.
 - 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.
- C. Install supports according to Section "Hangers and Supports."
- D. Support vertical piping and tubing at base and at each floor.
- E. Rod diameter may be reduced 1 size for double-rod hangers, to a minimum of 3/8 inch.
- F. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/4 (DN 32) and Smaller: 84 inches with 3/8-inch rod.
 - 2. NPS 1-1/2 (DN 40): 108 inches with 3/8-inch rod.
 - 3. NPS 2 (DN 50): 10 feet with 3/8-inch rod.
 - 4. NPS 2-1/2 (DN 65): 11 feet with 1/2-inch rod.
 - 5. NPS 3 and NPS 3-1/2 (DN 80 and DN 90): 12 feet with 1/2-inch rod.
- G. Install supports for vertical steel piping every 15 feet.

- H. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 3/4 (DN 20) and Smaller: 60 inches with 3/8-inch rod.
 - 2. NPS 1 and NPS 1-1/4 (DN 25 and DN 32): 72 inches with 3/8-inch rod.
 - 3. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 96 inches with 3/8-inch rod.
 - 4. NPS 2-1/2 (DN 65): 108 inches with 1/2-inch rod.
 - 5. NPS 3 to NPS 5 (DN 80 to DN 125): 10 feet with 1/2-inch rod.
- I. Install supports for vertical copper tubing every 10 feet.
- J. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.7 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to equipment and machines to allow 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, and extend and connect to the following:
 - 1. Water Heaters: Cold-water supply and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
 - 2. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code.
 - 3. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection.

3.8 FIELD QUALITY CONTROL

- A. Inspect domestic water piping as follows:
 - 1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
 - 2. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
 - a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 - b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

3. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

B. Test domestic water piping as follows:

1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
2. 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 separate report for each test, complete with diagram of portion of piping tested.
3. 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.
4. 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 to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.

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 flow of hot water in each branch.
 - b. Adjust calibrated balancing valves to flows indicated.
5. Remove plugs used during testing of piping and plugs used 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 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing domestic water piping that have been altered, extended, or repaired before using.
 2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction or, if methods are not prescribed, procedures described in either AWWA C651 or AWWA C652 or as described below:
 - a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - b. Fill and isolate system according to 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. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
- B. Prepare and submit reports of purging and disinfecting activities.
- C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

END OF SECTION 22 11 16

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 221119

DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes the following domestic water piping specialties:
 - 1. Vacuum breakers.
 - 2. Backflow preventers.
 - 3. Balancing valves.
 - 4. Temperature-actuated water mixing valves.
 - 5. Strainers.
 - 6. Hose bibbs.
 - 7. Non-Freeze Hose Bibbs.
 - 8. Drain valves.
 - 9. Water hammer arresters.
 - 10. Air vents.
 - 11. Trap-seal primer systems.
- B. Related Sections include the following:
 - 1. Section "Meters and Gages" for thermometers, pressure gages, and flow meters in domestic water piping.

1.3 PERFORMANCE REQUIREMENTS

- A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig, unless otherwise indicated.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.

- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

PART 2 - PRODUCTS

2.1 VACUUM BREAKERS

- A. Pressure Vacuum Breakers:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. Ames Co.
 - b. Conbraco Industries, Inc.
 - c. FEBCO; SPX Valves & Controls.
 - d. Flomatic Corporation.
 - e. Toro Company (The); Irrigation Div.
 - f. Watts Industries, Inc.; Water Products Div.
 - g. Zurn Plumbing Products Group; Wilkins Div.
 - 2. Standard: ASSE 1020.
 - 3. Operation: Continuous-pressure applications.
 - 4. Pressure Loss: 5 psig maximum, through middle 1/3 of flow range.
 - 5. Accessories:
 - a. Valves: Ball type, on inlet and outlet.

2.2 BACKFLOW PREVENTERS

- A. Reduced-Pressure-Principle Backflow Preventers:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. Ames Co.

- b. Conbraco Industries, Inc.
 - c. FEBCO; SPX Valves & Controls.
 - d. Watts Industries, Inc.; Water Products Div.
 - e. Zurn Plumbing Products Group; Wilkins Div.
- 2. Standard: ASSE 1013.
 - 3. Operation: Continuous-pressure applications.
 - 4. Pressure Loss: 12 psig maximum, through middle 1/3 of flow range.
 - 5. Body: Bronze for NPS 2 (DN 50) and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved for NPS 2-1/2 (DN 65) and larger.
 - 6. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 (DN 65) and larger.
 - 7. Configuration: Designed for horizontal, straight through flow.
 - 8. Accessories:
 - a. Valves: Ball type with threaded ends on inlet and outlet of NPS 2 (DN 50) and smaller; outside screw and yoke gate-type with flanged ends on inlet and outlet of NPS 2-1/2 (DN 65) and larger.
 - b. Air-Gap Fitting: ASME A112.1.2, matching backflow-preventer connection.
- B. Hose-Connection Backflow Preventers:
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Conbraco Industries, Inc.
 - b. Watts Industries, Inc.; Water Products Div.
 - c. Woodford Manufacturing Company.
 - 2. Standard: ASSE 1052.
 - 3. Operation: Up to 10-foot head of water back pressure.
 - 4. Inlet Size: NPS 1/2 or NPS 3/4 (DN 15 or DN 20).
 - 5. Outlet Size: Garden-hose thread complying with ASME B1.20.7.
 - 6. Capacity: At least 3-gpm flow.

2.3 BALANCING VALVES

- A. Copper-Alloy Calibrated Balancing Valves:
- 1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. Armstrong International, Inc.
 - b. Flo Fab Inc.
 - c. ITT Industries; Bell & Gossett Div.
 - d. NIBCO INC.
 - e. TAC Americas.
 - f. Taco, Inc.

- g. Watts Industries, Inc.; Water Products Div.
- 2. Type: Ball or Y-pattern globe valve with two readout ports and memory setting indicator.
- 3. Body: Brass or bronze,
- 4. Size: Same as connected piping, but not larger than NPS 2 (DN 50).
- 5. Accessories: Meter hoses, fittings, valves, differential pressure meter, and carrying case.
- B. Accessories: Meter hoses, fittings, valves, differential pressure meter, and carrying case.

2.4 TEMPERATURE-ACTUATED WATER MIXING VALVES

A. Water-Temperature Limiting Devices:

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. Armstrong International, Inc.
 - b. Cash Acme.
 - c. Legend Valve.
 - d. Leonard Valve Company.
 - e. Powers; a Watts Industries Co.
 - f. Symmons Industries, Inc.
 - g. Taco, Inc.
 - h. Watts Industries, Inc.; Water Products Div.
 - i. Zurn Plumbing Products Group; Wilkins Div.
- 2. Standard: ASSE 1017.
- 3. Pressure Rating: 125 psig.
- 4. Type: Thermostatically controlled water mixing valve.
- 5. Material: Bronze body with corrosion-resistant interior components.
- 6. Connections: Threaded union inlets and outlet.
- 7. Accessories: Check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
- 8. Valve Finish: Rough bronze.

B. Individual-Fixture, Water Tempering Valves:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Cash Acme.
 - b. Conbraco Industries, Inc.
 - c. Honeywell Water Controls.
 - d. Lawler Manufacturing Company, Inc.
 - e. Leonard Valve Company.
 - f. Powers; a Watts Industries Co.

- g. Watts Industries, Inc.; Water Products Div.
 - h. Zurn Plumbing Products Group; Wilkins Div.
- 2. Standard: ASSE 1016, thermostatically controlled water tempering valve.
 - 3. Pressure Rating: 125 psig (860 kPa) minimum, unless otherwise indicated.
 - 4. Body: Bronze body with corrosion-resistant interior components.
 - 5. Temperature Control: Adjustable.
 - 6. Inlets and Outlet: Threaded.
 - 7. Finish: Rough or chrome-plated bronze.

2.5 STRAINERS FOR DOMESTIC WATER PIPING

A. Y-Pattern Strainers:

- 1. Pressure Rating: 125 psig minimum, unless otherwise indicated.
- 2. Body: Bronze for NPS 2 (DN 50) and smaller; cast iron with interior lining complying with AWWA C550 or FDA-approved, epoxy coating and for NPS 2-1/2 (DN 65) and larger.
- 3. End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 (DN 65) and larger.
- 4. Screen: Stainless steel with round perforations, unless otherwise indicated.
- 5. Perforation Size:
 - a. Strainers NPS 2-1/2 to NPS 4 (DN 65 to DN 100): 0.062 inch.
- 6. Drain: Pipe plug.

2.6 OUTLET BOXES

A. Clothes Washer Outlet Boxes:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Acorn
 - b. Guy Gray Manufacturing Co., Inc.
 - c. IPS Corporation.
 - d. LSP Products Group, Inc.
 - e. Oatey.
 - f. Plastic Oddities; a division of Diverse Corporate Technologies.
 - g. Symmons Industries, Inc.
 - h. Watts Industries, Inc.; Water Products Div.
 - i. Whitehall Manufacturing; a div. of Acorn Company.
 - j. Zurn Plumbing Products Group; Light Commercial Operation.
- 2. Mounting: Recessed.
- 3. Material and Finish: Enameled-steel or epoxy-painted-steel box and faceplate.

4. Faucet: Combination, valved fitting or separate hot- and cold-water, valved fittings complying with ASME A112.18.1. Include garden-hose thread complying with ASME B1.20.7 on outlets.
5. Supply Shutoff Fittings: NPS 1/2 (DN 15) gate, globe, or ball valves and NPS 1/2 (DN 15) copper, water tubing.
6. Drain: NPS 2 (DN 50) standpipe and P-trap for direct waste connection to drainage piping.
7. Inlet Hoses: Two 60-inch- long, rubber household clothes washer inlet hoses with female, garden-hose-thread couplings. Include rubber washers.
8. Drain Hose: One 48-inch- long, rubber household clothes washer drain hose with hooked end.

2.7 HOSE BIBBS

A. Hose Bibbs:

1. Standard: ASME A112.18.1 for sediment faucets.
2. Body Material: Bronze.
3. Seat: Bronze, replaceable.
4. Supply Connections: NPS 1/2 or NPS 3/4 (DN 15 or DN 20) threaded or solder-joint inlet.
5. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
6. Pressure Rating: 125 psig.
7. Vacuum Breaker: Integral or field-installation, nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
8. Finish for Equipment Rooms: Rough bronze, or chrome or nickel plated.
9. Finish for Service Areas: Chrome or nickel plated.
10. Finish for Finished Rooms: Chrome or nickel plated.
11. Operation for Equipment Rooms: Wheel handle or operating key.
12. Operation for Service Areas: Wheel handle.
13. Operation for Finished Rooms: Wheel handle.
14. Include operating key with each operating-key hose bibb.
15. Include integral wall flange with each chrome- or nickel-plated hose bibb.

2.8 NON-FREEZE HOSE BIBBS

A. Nonfreeze Hose Bibbs:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Josam Company.
 - b. MIFAB, Inc.
 - c. Prier Products, Inc.
 - d. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - e. Tyler Pipe; Wade Div.

- f. Watts Drainage Products Inc.
 - g. Woodford Manufacturing Company.
 - h. Zurn Plumbing Products Group; Light Commercial Operation.
 - i. Zurn Plumbing Products Group; Specification Drainage Operation.
- 2. Standard: ASME A112.21.3M for exposed-outlet, self-draining Hose Bibbs.
 - 3. Pressure Rating: 125 psig.
 - 4. Operation: Loose key.
 - 5. Casing and Operating Rod: Of length required to match wall thickness. Include wall clamp.
 - 6. Inlet: NPS 3/4 or NPS 1 (DN 20 or DN 25).
 - 7. Outlet: Concealed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
 - 8. Box: Deep, flush mounting with cover.
 - 9. Box and Cover Finish: Chrome plated
 - 10. Outlet: Exposed, with integral vacuum breaker and garden-hose thread complying with ASME B1.20.7.
 - 11. Nozzle and Wall-Plate Finish: Polished nickel bronze.
 - 12. Operating Keys(s): One with each Hose Bibb.

2.9 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves:

- 1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
- 2. Pressure Rating: 400-psig minimum CWP.
- 3. Size: NPS 3/4 (DN 20).
- 4. Body: Copper alloy.
- 5. Ball: Chrome-plated brass.
- 6. Seats and Seals: Replaceable.
- 7. Handle: Vinyl-covered steel.
- 8. Inlet: Threaded or solder joint.
- 9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

B. Gate-Valve-Type, Hose-End Drain Valves:

- 1. Standard: MSS SP-80 for gate valves.
- 2. Pressure Rating: Class 125.
- 3. Size: NPS 3/4 (DN 20).
- 4. Body: ASTM B 62 bronze.
- 5. Inlet: NPS 3/4 (DN 20) threaded or solder joint.
- 6. Outlet: Garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

C. Stop-and-Waste Drain Valves:

1. Standard: MSS SP-110 for ball valves or MSS SP-80 for gate valves.
2. Pressure Rating: 200-psig minimum CWP or Class 125.
3. Size: NPS 3/4 (DN 20).
4. Body: Copper alloy or ASTM B 62 bronze.
5. Drain: NPS 1/8 (DN 6) side outlet with cap.

2.10 WATER HAMMER ARRESTERS

A. Water Hammer Arresters:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AMTROL, Inc.
 - b. Josam Company.
 - c. MIFAB, Inc.
 - d. PPP Inc.
 - e. Sioux Chief Manufacturing Company, Inc.
 - f. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - g. Tyler Pipe; Wade Div.
 - h. Watts Drainage Products Inc.
 - i. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASSE 1010 or PDI-WH 201.
3. Type: Metal bellows.
4. Size: ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.

2.11 AIR VENTS

A. Welded-Construction Automatic Air Vents:

1. Body: Stainless steel.
2. Pressure Rating: 150-psig minimum pressure rating.
3. Float: Replaceable, corrosion-resistant metal.
4. Mechanism and Seat: Stainless steel.
5. Size: NPS 3/8 (DN 10) minimum inlet.
6. Inlet and Vent Outlet End Connections: Threaded.

2.12 TRAP-SEAL PRIMER SYSTEMS

A. Trap-Seal Primer Systems:

1. Basis-of-Design Product: Subject to compliance with requirements, provide or a comparable product by one of the following:
 - a. PPP Inc.

2. Standard: ASSE 1044,
3. Piping: NPS 3/4, ASTM B 88, Type L (DN 20, ASTM B 88M, Type B); copper, water tubing.
4. Cabinet: Recessed-mounting steel box with stainless-steel cover.
5. Electric Controls: 24-hour timer, solenoid valve, and manual switch for 120-V ac power.
6. Vacuum Breaker: ASSE 1001.
7. Number Outlets: Four.
8. Size Outlets: NPS 1/2 (DN 15).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.
 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 not acceptable for this application.
 3. Do not install bypass piping around backflow preventers.
- B. Install water regulators with inlet and outlet shutoff valves and bypass with memory-stop balancing valve. Install pressure gages on inlet and outlet.
- C. Install water control valves with inlet and outlet shutoff valves and bypass with globe valve. Install pressure gages on inlet and outlet.
- D. Install balancing valves in locations where they can easily be adjusted.
- E. Install temperature-actuated water mixing valves with check stops or shutoff valves on inlets and with shutoff valve on outlet.
 1. Install thermometers and water regulators if specified.
 2. Install cabinet-type units recessed in or surface mounted on wall as specified.
- F. Install outlet boxes recessed in wall. Install 2-by-4-inch fire-retardant-treated-wood blocking wall reinforcement between studs.
- G. Install hose stations with check stops or shutoff valves on inlets and with thermometer on outlet.
 1. Install shutoff valve on outlet if specified.

2. Install cabinet-type units recessed in or surface mounted on wall as specified. Install 2-by-4-inch fire-retardant-treated-wood blocking wall reinforcement between studs.

- H. Install water hammer arresters in water piping according to PDI-WH 201.
- I. Install air vents at high points of water piping. Install drain piping and discharge onto floor drain.
- J. Install supply-type, trap-seal primer valves 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.
- K. Install drainage-type, trap-seal primer valves as lavatory trap with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting.
- L. Install trap-seal primer systems 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.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping and specialties.

3.3 LABELING AND IDENTIFYING

- A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:
 1. Pressure vacuum breakers.
 2. Reduced-pressure-principle backflow preventers.
 3. Reduced-pressure-detector, fire-protection backflow-preventer assemblies.
 4. Thermostatic water mixing valves.
 5. Hose stations.
 6. Trap-seal primer systems.
- B. 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 " Identification."

3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and prepare test reports:

1. Test each reduced-pressure-principle backflow preventer, detector-assembly backflow preventer according to authorities having jurisdiction and the device's reference standard.
- B. Remove and replace malfunctioning domestic water piping specialties and retest as specified above.

3.5 ADJUSTING

- A. Set field-adjustable flow set points of balancing valves.
- B. Set field-adjustable temperature set points of temperature-actuated water mixing valves.

END OF SECTION 22 11 19

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 221316

SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes the following for soil, waste, and vent piping inside the building:
 - 1. Pipe, tube, and fittings.
 - 2. Special pipe fittings.
- B. Related Sections include the following:
 - 1. Section "Sump Pumps."

1.3 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working pressure, unless otherwise indicated:
 - 1. Soil, Waste, and Vent Piping: 10-foot head of water.
 - 2. Sanitary Sewer, Force-Main Piping: 50 psig.
- B. Seismic Performance: Soil, waste, and vent piping and support and installation shall be capable of withstanding the effects of seismic events determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures."

1.4 SUBMITTALS

- A. Product Data: For pipe, tube, fittings, and couplings.
- B. Shop Drawings:
 - 1. Design Calculations: Signed and sealed by a qualified professional engineer licensed in the State of New York for selecting seismic restraints.

- C. Field quality-control inspection and test reports.

1.5 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified, or approved equal.

2.2 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.3 HUBLESS CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 888 or CISPI 301.
- B. Shielded Couplings: ASTM C 1277 assembly of metal shield or housing, corrosion-resistant fasteners, and rubber sleeve with integral, center pipe stop.
 - 1. Standard, Shielded, Stainless-Steel Couplings: CISPI 310, with stainless-steel corrugated shield; stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve.
 - a. Manufacturers:
 - 1) ANACO.
 - 2) Fernco, Inc.
 - 3) Ideal Div.; Stant Corp.
 - 4) Mission Rubber Co.
 - 5) Tyler Pipe; Soil Pipe Div.
 - 2. Heavy-Duty, Shielded, Stainless-Steel Couplings: With stainless-steel shield, stainless-steel bands and tightening devices, and ASTM C 564, rubber sleeve.
 - a. Manufacturers:
 - 1) ANACO.

- 2) Clamp-All Corp.
 - 3) Ideal Div.; Stant Corp.
 - 4) Mission Rubber Co.
 - 5) Tyler Pipe; Soil Pipe Div.
3. Heavy-Duty, Shielded, Cast-Iron Couplings: ASTM A 48/A 48M, two-piece, cast-iron housing; stainless-steel bolts and nuts; and ASTM C 564, rubber sleeve.
- a. Manufacturer:
 - 1) MG Piping Products Co.
 - 2) Mission Rubber Co.
 - 3) Tyler Pipe; Soil Pipe Div.

2.4 SPECIAL PIPE FITTINGS

- A. Flexible, Nonpressure Pipe Couplings: Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition pattern. Include shear ring, ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.
1. Manufacturers:
 - a. Dallas Specialty & Mfg. Co.
 - b. Fernco, Inc.
 - c. Logan Clay Products Company (The).
 - d. Mission Rubber Co.
 - e. NDS, Inc.
 - f. Plastic Oddities, Inc.
- B. Shielded Nonpressure Pipe Couplings: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
1. Manufacturers:
 - a. Cascade Waterworks Mfg. Co.
 - b. Mission Rubber Co.
 - c. Cascade Waterworks Mfg. Co.
 - d. Dresser, Inc.; DMD Div.
 - e. EBAA Iron Sales, Inc.
- C. Rigid, Unshielded, Nonpressure Pipe Couplings: ASTM C 1461, sleeve-type reducing- or transition-type mechanical coupling molded from ASTM C 1440, TPE material with corrosion-resistant-metal tension band and tightening mechanism on each end.
1. Manufacturer:

- a. ANACO.
 - b. Cascade Waterworks Mfg. Co.
 - c. Dresser, Inc.; DMD Div.
 - d. EBAA Iron Sales, Inc.
- D. Pressure Pipe Couplings: AWWA C219 metal, sleeve-type same size as, with pressure rating at least equal to, and ends compatible with, pipes to be joined.
 - 1. Manufacturers:
 - a. Cascade Waterworks Mfg. Co.
 - b. Dresser, Inc.; DMD Div.
 - c. EBAA Iron Sales, Inc.
 - d. Ford Meter Box Company, Inc. (The); Pipe Products Div.
 - e. JCM Industries, Inc.
 - f. Romac Industries, Inc.
 - g. Smith-Blair, Inc.
 - h. Viking Johnson.
 - 2. Center-Sleeve Material: Manufacturer's standard.
 - 3. Gasket Material: Natural or synthetic rubber.
 - 4. Metal Component Finish: Corrosion-resistant coating or material.
- E. Flexible Ball Joints: Ductile-iron fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include gasketed ball-joint section and ductile-iron gland, rubber gasket, and steel bolts.
 - 1. Manufacturers:
 - a. EBAA Iron Sales, Inc.
 - b. Romac Industries, Inc.
 - c. Star Pipe Products; Star Fittings Div.
- F. Expansion Joints: Two or three-piece, ductile-iron assembly consisting of telescoping sleeve(s) with gaskets and restrained-type, ductile-iron, bell-and-spigot end sections complying with AWWA C110 or AWWA C153. Select and assemble components for expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.
 - 1. Manufacturers:
 - a. EBAA Iron Sales, Inc.
 - b. Romac Industries, Inc.
 - c. Star Pipe Products; Star Fittings Div.
- G. Wall-Penetration Fittings: Compound, ductile-iron coupling fitting with sleeve and flexing sections for up to 20-degree deflection, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.

1. Manufacturers:
 - a. SIGMA Corp.
 - b. Cascade Waterworks Mfg. Co.
 - c. Dresser, Inc.; DMD Div.
 - d. EBAA Iron Sales, Inc.

PART 3 - EXECUTION

3.1 EXCAVATION

- A. Excavating, trenching, and backfilling is specified.

3.2 PIPING APPLICATIONS

- A. Flanges and unions may be used on aboveground pressure piping, unless otherwise indicated.
- B. Aboveground, soil and waste piping NPS 4 (DN 100) and smaller shall be the following:
 1. Hubless cast-iron soil pipe and fittings: heavy-duty shielded, stainless-steel couplings; and hubless-coupling joints.
- C. Aboveground, soil and waste piping NPS 5 (DN 125) and larger shall be the following:
 1. Hubless cast-iron soil pipe and fittings; heavy-duty shielded, stainless-steel couplings; and hubless-coupling joints.
- D. Aboveground, vent piping NPS 4 (DN 100) and smaller shall be the following:
 1. Hubless cast-iron soil pipe and fittings; heavy-duty shielded, stainless-steel couplings; and hubless-coupling joints.
- E. Underground, soil, waste, and vent piping NPS 4 (DN 100) and smaller shall be the following:
 1. Extra-Heavy class, cast-iron soil piping; gaskets; and compression joints.
- F. Underground, soil and waste piping NPS 5 (DN 125) and larger shall be the following:
 1. Extra-Heavy class, cast-iron soil piping; gaskets; and compression joints.
- G. Aboveground sanitary-sewage force mains NPS 1-1/2 and NPS 2 (DN 40 and DN 50) shall be the following:
 1. Steel pipe and threaded joints.

3.3 PIPING INSTALLATION

- A. Basic piping installation requirements are specified in Section "Basic Materials and Methods."

- B. Install seismic restraints on piping. Seismic-restraint devices are specified in Section "Vibration and Seismic Controls."
- C. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers.
- D. Install cleanout fitting with closure plug inside the building in sanitary force-main piping.
- E. Install underground, ductile-iron, special pipe fittings according to AWWA C600.
- F. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to make installation watertight. Sleeves and mechanical sleeve seals are specified in Section "Basic Mechanical Materials and Methods."
- G. Install wall-penetration fitting at each service pipe penetration through foundation wall. Make installation watertight.
- H. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
- I. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. 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. Use long-turn, double Y-branch and 1/8-bend fittings if 2 fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- J. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- K. Install soil and waste drainage and vent piping at the following minimum slopes, unless otherwise indicated:
 - 1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 (DN 80) and smaller; 1 percent downward in direction of flow for piping NPS 4 (DN 100) and larger.
 - 2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.
 - 3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.
- L. Install soil and waste drainage and vent piping systems as follows:
 - 1. Combination Waste and Vent: Comply with standards of authorities having jurisdiction.

2. Reduced-Size Venting: Comply with standards of authorities having jurisdiction.
- M. Sleeves are not required for cast-iron soil piping passing through concrete slabs-on-grade if slab is without membrane waterproofing.
- N. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.4 JOINT CONSTRUCTION

- A. Basic piping joint construction requirements are specified in Section "Basic Materials and Methods."
- B. Join hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.

3.5 VALVE INSTALLATION

- A. General valve installation requirements are specified in Section "Valves."
- B. Shutoff Valves: Install shutoff valve on each sewage pump discharge.
 1. Install gate or full-port ball valve for piping NPS 2 (DN 50) and smaller.
 2. Install gate valve for piping NPS 2-1/2 (DN 65) 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 sewage 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. Backwater valve are specified in Section "Plumbing Specialties."

3.6 HANGER AND SUPPORT INSTALLATION

- A. Seismic-restraint devices are specified in Section "Mechanical Vibration Controls and Seismic Restraints."
- B. Pipe hangers and supports are specified in Section "Hangers and Supports." Install the following:
 1. Vertical Piping: MSS Type 8 or Type 42, clamps.

2. Install individual, straight, horizontal piping runs according to the following:
 - 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.
 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.
- C. Install supports according to Section "Hangers and Supports."
- D. Support vertical piping and tubing at base and at each floor.
- E. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch minimum rods.
- F. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
1. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 60 inches with 3/8-inch rod.
 2. NPS 3 (DN 80): 60 inches with 1/2-inch rod.
 3. NPS 4 and NPS 5 (DN 100 and DN 125): 60 inches with 5/8-inch rod.
 4. NPS 6 (DN 150): 60 inches with 3/4-inch rod.
- G. Install supports for vertical cast-iron soil piping every 15 feet.
- H. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

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 drainage and vent piping to the following:
1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
 3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
 4. Equipment: Connect drainage piping as indicated. Provide shutoff valve, if indicated, and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 (DN 65) and larger.

- D. Connect force-main piping to the following:
 - 1. Sanitary Sewer: To exterior force main or sanitary manhole.

3.8 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 - 1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 - 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 - 1. 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 separate report for each test, complete with diagram of portion of piping tested.
 - 2. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - 3. Roughing-in Plumbing Test Procedure: Test drainage and vent piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
 - 4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
 - 5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 - 6. Prepare reports for tests and required corrective action.
- E. Test force-main piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Leave uncovered and unconcealed new, altered, extended, or replaced force-main piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
2. 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 to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
3. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
4. Prepare reports for tests and required corrective action.

3.9 CLEANING

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains 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.

END OF SECTION 22 13 16

SECTION 221319

SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes the following sanitary drainage piping specialties:
 - 1. Backwater valves.
 - 2. Cleanouts.
 - 3. Floor drains.
 - 4. Roof flashing assemblies.
 - 5. Through-penetration firestop assemblies.
 - 6. Miscellaneous sanitary drainage piping specialties.
 - 7. Flashing materials.
 - 8. Solids interceptors.
- B. Related Sections include the following:
 - 1. Section "Storm Drainage Piping Specialties" for trench drains for storm water, channel drainage systems for storm water, roof drains, and catch basins.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and accessories.
- B. Manufacturer Seismic Qualification Certification: Submit certification that all accessories and components will withstand seismic forces defined in Section "Vibration and Seismic Controls for Plumbing Piping and Equipment." Include the following:
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

- a. 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."
 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.
- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For drainage piping specialties to include in emergency, operation, and maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic sanitary piping specialty components.

1.5 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Coordinate size and location of roof penetrations.

PART 2 - PRODUCTS

2.1 BACKWATER VALVES

- A. Horizontal, Cast-Iron Backwater Valves:
 1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. Josam Company; Josam Div., Model 67500-10
 - b. MIFAB, Inc, Model BV1200
 - c. Smith, Jay R. Mfr. Co.; Division of Smith Industries, Inc., Model 7022
 - d. Zurn Plumbing Products Group; Specification Drainage Operation, Model Z-1095-77

2. Standard: ASME A112.14.1.
3. Size: Same as connected piping.
4. Body: Cast iron.
5. Cover: Cast iron with threaded access check valve.
6. End Connections: Hubless.
7. Type Check Valve: Removable, bronze, swing check, factory assembled or field modified to hang closed.
8. Extension: ASTM A 74, Service class; full-size, cast-iron, soil-pipe extension to field-installed cleanout at floor; replaces backwater valve cover.

2.2 CLEANOUTS

A. Exposed Metal Cleanouts:

1. Basis-of-Design Product: Subject to compliance with requirements, provide or a comparable product by one of the following:
 - a. MIFAB, Inc.
 - b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - c. Wade
2. Standard: ASME A112.36.2M for cast iron for cleanout test tee.
3. Size: Same as connected drainage piping
4. Body Material: Hubless, cast-iron soil pipe test tees required to match connected piping.
5. Closure: cast-iron plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
7. Closure: Stainless-steel plug with seal.

B. Metal Floor Cleanouts:

1. Basis-of-Design Product: Subject to compliance with requirements, provide or a comparable product by one of the following:
 - a. MIFAB, Inc.
 - b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - c. Wade
2. Standard: ASME A112.36.2M heavy-duty, adjustable housing cleanout.
3. Size: Same as connected branch.
4. Type: Heavy-duty, adjustable housing.
5. Body or Ferrule: Cast iron.
6. Clamping Device: Required.
7. Outlet Connection: Spigot.
8. Closure: Brass plug with straight threads and gasket.
9. Adjustable Housing Material: Cast iron.
10. Frame and Cover Material and Finish: Painted cast iron.
11. Frame and Cover Shape: Round.
12. Top Loading Classification: Extra Heavy Duty.
13. Riser: ASTM A 74, Extra-Heavy class, cast-iron drainage pipe fitting and riser to cleanout.

14. Standard: ASME A112.3.1.
15. Size: Same as connected branch.
16. Housing: Stainless steel.
17. Closure: Stainless steel with seal.
18. Riser: Stainless-steel drainage pipe fitting to cleanout.

C. Cast-Iron Wall Cleanouts:

1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. MIFAB, Inc.
 - b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - c. Wade
2. Standard: ASME A112.36.2M. Include wall access.
3. Size: Same as connected drainage piping.
4. Body: Hub-and-spigot, cast-iron soil pipe T-branch as required to match connected piping.
5. Closure: cast-iron plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
7. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw.
8. Wall Access: Square, wall-installation frame and cover.

D. Cleanout Schedule:

<u>Location</u>	<u>Piping</u>	<u>Figure Number</u>
Wall	Exposed Cast Iron	Smith 4420 Wade W-8550E w/8480R MIFAB C1450
Wall	Exposed Steel	Smith 4470 Wade W-8590E w/8480R MIFAB C1430
Wall	Concealed Cast Iron	Smith 4532-U Wade W-8560E w/8480R MIFAB C1460-RD-6
Wall	Concealed Steel	Smith 4472-U Wade W-8590E w/8480R MIFAB C1430-RD-6
Floor-Concrete	Steel or Cast Iron	Smith 4248-U Wade W-6000Z MIFAB C1100-XR
Floor-General Finished Area	Cast Iron	Smith 4028-U Wade W-6000-1 MIFAB C1100

2.3 FLOOR DRAINS

A. Cast-Iron Floor Drains:

1. Standard: ASME A112.6.3 with backwater valve.
2. Pattern: Floor drain.
3. Body Material: Gray iron.
4. Seepage Flange: Required.
5. Anchor Flange: Required.
6. Clamping Device: Required.
7. Outlet: Bottom
8. Backwater Valve: Integral, ASME A112.14.1, swing-check type.
9. Coating on Interior and Exposed Exterior Surfaces: Not required.
10. Sediment Bucket: Not required.
11. Top or Strainer Material: Gray iron.
12. Top of Body and Strainer Finish: Nickel bronze.
13. Top Shape: Round
14. Funnel: Not required.
15. Inlet Fitting: Gray iron, with threaded inlet and threaded or spigot outlet and trap-seal primer valve connection.
16. Trap Material: Cast iron.
17. Trap Pattern: Standard P-trap.
18. Trap Features: Trap-seal primer valve drain connection.

B. Drain Types:

1. Type A: (Toilet Room/Shower) shall be cast iron with double drainage flange and seepage openings, bottom outlet connection, flashing clamp device, and 6" round adjustable strainer of high polished brass or bronze. Individual shower compartments use a 6" round adjustable strainer of high polished nickel bronze.
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - 1) Smith 2010-A
 - 2) Zurn Z-415-103-VP
 - 3) Josam 30000-6A-X (toilet/shower)
 - 4) Wade W-1100 or MIFAB F1000C
2. Type B: (Kitchen Floor Drain/Indirect Waste Clear Water): Drain shall be cast-iron with acid resistant coated interior and exterior, bottom outlet, flashing collar, adjustable nickel bronze top and 1/2 bar grate with sediment bucket.
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - 1) 2360-NB-12-ARC(I&O)
 - 2) Zurn ZN-526-76
 - 3) Josam 31220-1-27-79-X
 - 4) MIFAB F1340C-14-5-1-3M

3. Type C: (Kitchen Floor Drain): Drain shall be cast-iron with acid resistant coated interior and exterior, bottom outlet, flashing collar, adjustable nickel bronze top and full bar grate with sediment bucket
 - b. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - 1) Smith 2360-NB-ARC(I&O),
 - 2) Zurn Z-526-77
 - 3) Josam 31220-1-79-X
 - 4) MIFAB F1340C-14-5-1-3M
4. Type D: (Kitchen Funnel Receptor/Indirect Waste Clear Water) shall be cast iron with double drainage flange and seepage openings, bottom outlet connection and 7" diameter adjustable strainer with sediment bucket of high polished brass or bronze.
 - c. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - 1) Smith 3510-F37
 - 2) Zurn Z-415-104
 - 3) Josam 30000-7E1-2-80-X
 - 4) MIFAB F1100C-ER7-1-5
7. Type E: (Membrane Waterproof Floor) shall be cast iron with bottom outlet connection, double drainage flange with drainage openings, removable cast iron sediment bucket with perimeter drainage slots, loose set polished bronze grate so designed that grate cannot be set unless bucket is in position.
 - d. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - 1) Smith 2220
 - 2) Zurn Z-554-75-VP
 - 3) Josam 32120-2-17-X
 - 4) MIFAB F1320C-Y-5-14-1
10. Type F: (Boiler Room, Mechanical Spaces, Meter Rooms) shall be cast iron, triple drainage side outlet caulk connection, medium duty round grate and slotted sediment bucket with 3/8" or 1/4" bottom drainage openings, so designed that grate cannot be set unless bucket is in position.
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - 1) Smith 2235
 - 2) Zurn Z-540-83
 - 3) Josam 32220-17-66-X
 - 4) MIFAB F1340-Y-5-90

2.4 TRENCH DRAINS

A. Trench Drains:

1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings.
2. Standard: ASME A112.6.3 for trench drains.
3. Material: Ductile or gray iron.
4. Flange: Seepage.
5. Clamping Device: Required.
6. Outlet: Bottom.
7. Grate Material: Ductile iron or gray iron.
8. Grate Finish: Not required.
9. Top Loading Classification: Extra Heavy-Duty.
10. Trap Material: Cast iron.
11. Trap Pattern: Standard P-trap.

2.5 ROOF FLASHING ASSEMBLIES

A. Roof Flashing Assemblies:

1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. Jay R. Smith, Model no. 1740.
 - b. Josam, Model no. 26450.
 - c. MIFAB, Model no. MI-910.
 - d. Zurn, Model no. Z-196.

B. Description: Manufactured assembly made of 6.0-lb/sq. ft., 0.0938-inch- thick, lead flashing collar and skirt extending at least from pipe, with galvanized-steel boot reinforcement and counter flashing fitting.

1. Open-Top Vent Cap: Without cap.
2. Low-Silhouette Vent Cap: With vandal-proof vent cap.
3. Extended Vent Cap: With field-installed, vandal-proof vent cap.

2.6 THROUGH-PENETRATION FIRESTOP ASSEMBLIES

A. Through-Penetration Firestop Assemblies:

1. Standard: UL 1479 assembly of sleeve and stack fitting with firestopping plug.
2. Size: Same as connected soil, waste, or vent stack.
3. Sleeve: Molded PVC plastic, of length to match slab thickness and with integral nailing flange on one end for installation in cast-in-place concrete slabs.
4. Stack Fitting: ASTM A 48/A 48M, gray-iron, hubless-pattern, wye branch with neoprene O-ring at base and gray-iron plug in thermal-release harness. Include PVC protective cap for plug.
5. Special Coating: Corrosion resistant on interior of fittings.

2.7 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Open Drains:

1. Description: Shop or field fabricate from ASTM A 74, Service class, hub-and-spigot, cast-iron, soil-pipe fittings. Include P-trap, hub-and-spigot riser section; and where required, increaser fitting joined with ASTM C 564, rubber gaskets.
2. Size: Same as connected waste piping.

B. Deep-Seal Traps:

1. Description: Cast-iron or bronze casting, with inlet and outlet matching connected piping and cleanout trap-seal primer valve connection.
2. Size: Same as connected waste piping.
 - a. NPS 2 (DN 50): 4-inch- minimum water seal.
 - b. NPS 2-1/2 (DN 65) and Larger: 5-inch- minimum water seal.

C. Floor-Drain, Trap-Seal Primer Fittings:

1. Description: Cast iron, with threaded inlet and threaded or spigot outlet, and trap-seal primer valve connection.
2. Size: Same as floor drain outlet with NPS 1/2 (DN 15) side inlet.

D. 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.

E. Sleeve Flashing Device:

1. Description: Manufactured, cast-iron fitting, with clamping device, that forms sleeve for pipe floor penetrations of floor membrane. Include galvanized-steel pipe extension in top of fitting that will extend 1 inch, 2 inches above finished floor and galvanized-steel pipe extension in bottom of fitting that will extend through floor slab.
2. Size: As required for close fit to riser or stack piping.

F. 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.

G. 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.

H. 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.

2.8 FLASHING MATERIALS

A. Lead Sheet: ASTM B 749, Type L51121, copper bearing, with the following minimum weights and thicknesses, unless otherwise indicated:

1. General Use: 4.0-lb/sq. ft., 0.0625-inch thickness.
2. Vent Pipe Flashing: 3.0-lb/sq. ft., 0.0469-inch thickness.
3. Burning: 6-lb/sq. ft., 0.0938-inch thickness.

B. Fasteners: Metal compatible with material and substrate being fastened.

C. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.

D. Solder: ASTM B 32, lead-free alloy.

E. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

2.9 SOLIDS INTERCEPTORS

A. Solids Interceptors:

1. Basis-of-Design Product: Subject to compliance with requirements, provide **the product indicated on Drawings** or a comparable product by one of the following:
 - a. Josam Company; Josam Div.
 - b. MIFAB, Inc.
 - c. Rockford Sanitary Systems, Inc.
 - d. Schier Products Company.
 - e. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
2. Type: Factory-fabricated interceptor made for removing and retaining **sediment** from wastewater.
3. Body Material: Cast iron or steel.
4. Interior Separation Device: **Baffles**.
5. Interior Lining: Corrosion-resistant enamel.

6. Mounting: Above floor.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install backwater valves in building drain piping. For interior installation, provide cleanout deck plate flush with floor and centered over backwater valve cover, and of adequate size to remove valve cover for servicing.
- B. 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 (DN 100). Use NPS 4 (DN 100) 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 (DN 100) and smaller and 100 feet for larger piping.
 - 4. Locate at base of each vertical soil and waste stack.
- C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.
- D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.
- E. 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. Set with grates depressed according to the following drainage area radii:
 - 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.
 - 3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.
 - 4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.
- F. Install trench drains at low points of surface areas to be drained. Set grates of drains flush with finished surface, unless otherwise indicated.

- G. Assemble and install ASME A112.3.1, stainless-steel channel drainage systems according to ASME A112.3.1. Install on support devices so that top will be flush with surface.
- H. Install roof flashing assemblies on sanitary stack vents and vent stacks that extend through roof.
- I. Install flashing fittings on sanitary stack vents and vent stacks that extend through roof.
- J. Install through-penetration firestop assemblies in plastic conductors and stacks at floor penetrations.
- K. Assemble open drain fittings and install with top of hub 2 inches above floor.
- L. Install deep-seal traps on floor drains and other waste outlets, if indicated.
- M. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.
 - 1. Size: Same as floor drain inlet.
- N. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.
- O. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.
- P. Install vent caps on each vent pipe passing through roof.
- Q. Install frost-resistant vent terminals on each vent pipe passing through roof. Maintain 1-inch clearance between vent pipe and roof substrate.
- R. Install expansion joints on vertical stacks and conductors. Position expansion joints for easy access and maintenance.
- S. Install frost-proof vent caps on each vent pipe passing through roof. Maintain 1-inch clearance between vent pipe and roof substrate.
- T. Install wood-blocking reinforcement for wall-mounting-type specialties.
- U. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.
- V. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

3.2 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.

- B. Install piping adjacent to equipment to allow service and maintenance.

3.3 FLASHING INSTALLATION

- A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:
 - 1. Lead Sheets: Burn joints of lead sheets 6.0-lb/sq. ft, 0.0938-inch thickness or thicker.
- B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
 - 1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches, and skirt or flange extending at least 8 inches around pipe.
 - 2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
- C. Set flashing on floors and roofs in solid coating of bituminous cement.
- D. Secure flashing into sleeve and specialty clamping ring or device.
- E. Install flashing for piping passing through roofs with counter flashing or commercially made flashing fittings.
- F. Extend flashing up vent pipe passing through roofs and turn down into pipe, or secure flashing into cast-iron sleeve having calking recess.
- G. Fabricate and install flashing and pans, sumps, and other drainage shapes.

3.4 LABELING AND IDENTIFYING

- A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on all equipment.
- B. 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 "Identification for Plumbing Piping and Equipment."

3.5 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.6 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 22 13 19

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 221413

STORM DRAINAGE PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes the following storm drainage piping inside the building:
 - 1. Pipe, tube, and fittings.
 - 2. Special pipe fittings.

1.3 PERFORMANCE REQUIREMENTS

- A. Components and installation shall be capable of withstanding the following minimum working-pressure, unless otherwise indicated:
 - 1. Storm Drainage Piping: 10-foot head of water.
- B. Seismic Performance: Soil, waste, and vent piping and support and installation shall be capable of withstanding the effects of seismic events determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures.

1.4 SUBMITTALS

- A. Product Data: For pipe, tube, fittings, and couplings.
- B. Shop Drawings:
 - 1. Design Calculations: Signed and sealed by a qualified professional engineer licensed in the State of New York for selecting seismic restraints.
 - 2. Controlled-Flow Storm Drainage System: Include calculations, plans, and details.
- C. Field quality-control inspection and test reports.

1.5 QUALITY ASSURANCE

- A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified, or approved equal.

2.2 PIPING MATERIALS

- A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining materials.

2.3 HUBLESS CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings: ASTM A 888 or CISPI 301.
- B. Shielded Couplings: ASTM C 1277 assembly of metal shield or housing, corrosion-resistant fasteners, and rubber sleeve with integral, center pipe stop.
1. Standard, Shielded, Stainless-Steel Couplings: CISPI 310, with stainless-steel corrugated shield; stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve.
 - a. Manufacturers:
 - 1) ANACO.
 - 2) Fernco, Inc.
 - 3) Ideal Div.; Stant Corp.
 - 4) Mission Rubber Co.
 - 5) Tyler Pipe; Soil Pipe Div.

2.4 SPECIAL PIPE FITTINGS

- A. Flexible, Nonpressure Pipe Couplings: Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition pattern. Include shear ring, ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.
1. Manufacturers:
 - a. Dallas Specialty & Mfg. Co.
 - b. Fernco, Inc.

- c. Logan Clay Products Company (The).
 - d. Mission Rubber Co.
 - e. NDS, Inc.
- 2. Sleeve Materials:
 - a. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
- B. Shielded Nonpressure Pipe Couplings: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
 - 1. Manufacturers:
 - a. Cascade Waterworks Mfg. Co.
 - b. Mission Rubber Co.
 - c. Tyler Pipe; Soil Pipe Div.
- C. Wall-Penetration Fittings: Compound, ductile-iron coupling fitting with sleeve and flexing sections for up to 20-degree deflection, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

- A. Flanges and unions may be used on aboveground pressure piping, unless otherwise indicated.
- B. Aboveground storm drainage piping NPS 2 to NPS 6 (DN 50 to DN 150) and smaller shall be the following:
 - 1. Hubless cast-iron soil pipe and fittings; standard shielded, stainless-steel couplings; and coupled joints.
- C. Aboveground, storm drainage piping NPS 8 (DN 200) and larger shall be the following:
 - 1. Hubless cast-iron soil pipe and fittings; standard, shielded, stainless-steel couplings; and coupled joints.

3.2 PIPING INSTALLATION

- A. Install seismic restraints on piping.
- B. Install cleanouts at grade and extend to where building storm drains connect to building storm sewers. Cleanouts are specified in Section "Sanitary Waste Plumbing Specialties."
- C. Install cast-iron sleeve with water stop and mechanical sleeve seal at each service pipe penetration through foundation wall. Select number of interlocking rubber links required to

make installation watertight. Sleeves and mechanical sleeve seals are specified in Section "Basic Materials and Methods."

- D. Install wall-penetration fitting system at each service pipe penetration through foundation wall. Make installation watertight.
- E. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
- F. Make changes in direction for storm piping using appropriate branches, bends, and long-sweep bends. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- G. Install storm drainage piping at the following minimum slopes, unless otherwise indicated:
 - 1. Building Storm Drain: 1 percent downward in direction of flow for piping NPS 3 (DN 80) and smaller; 1 percent downward in direction of flow for piping NPS 4 (DN 100) and larger.
 - 2. Horizontal Storm-Drainage Piping: 2 percent downward in direction of flow.
- H. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

3.3 JOINT CONSTRUCTION

- A. Hubless Cast-Iron Soil Piping Coupled Joints: Join according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.

3.4 VALVE INSTALLATION

- A. Shutoff Valves: Install shutoff valve on each sump pump discharge.
 - 1. Install gate or full-port ball valve for piping NPS 2 (DN 50) and smaller.
 - 2. Install gate valve for piping NPS 2-1/2 (DN 65) and larger.
- B. Check Valves: Install swing check valve, between pump and shutoff valve, on each sump pump discharge.
- C. Backwater Valves: Install backwater valves in piping subject to backflow.
 - 1. Horizontal Piping: Horizontal backwater valves.
 - 2. Install backwater valves in accessible locations.
 - 3. Backwater valve are specified in Section "Sanitary Waste Plumbing Specialties."

3.5 HANGER AND SUPPORT INSTALLATION

- A. Seismic-restraint devices are specified in Section "Vibration Controls and Seismic Restraints."

- B. Pipe hangers and supports are specified in Section "Hangers and Supports." Install the following:
 - 1. Vertical Piping: MSS Type 8 or Type 42, clamps.
 - 2. Individual, Straight, Horizontal Piping Runs: According to the following:
 - 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.
 - 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.
- C. Support vertical piping and tubing at base and at each floor.
- D. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch (10-mm) minimum rods.
- E. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
 - 1. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 60 inches with 3/8-inch rod.
 - 2. NPS 3 (DN 80): 60 inches with 1/2-inch rod.
 - 3. NPS 4 and NPS 5 (DN 100 and DN 125): 60 inches with 5/8-inch rod.
 - 4. NPS 6 (DN 150): 60 inches with 3/4-inch rod.
 - 5. NPS 8 to NPS 12 (DN 200 to DN 300): 60 inches with 7/8-inch rod.
 - 6. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.
- F. Install supports for vertical cast-iron soil piping every 15 feet.
- G. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.6 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.

3.7 FIELD QUALITY CONTROL

- A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in.
 2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
- B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
- C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
- D. Test storm drainage piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
1. 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 separate report for each test, complete with diagram of portion of piping tested.
 2. Leave uncovered and unconcealed new, altered, extended, or replaced storm drainage piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 3. Test Procedure: Test storm drainage piping, except outside leaders, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
 4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 5. Prepare reports for tests and required corrective action.

3.8 CLEANING

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect drains 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.

END OF SECTION 22 14 13

SECTION 221423

STORM DRAINAGE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes the following storm drainage piping specialties:
 - 1. Cleanouts.
 - 2. Through-penetration firestop assemblies.
 - 3. Roof drains.
 - 4. Miscellaneous storm drainage piping specialties.
 - 5. Flashing materials.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

1.5 COORDINATION

- A. Coordinate size and location of roof penetrations.

PART 2 - PRODUCTS

2.1 CLEANOUTS

- A. Exposed Metal Cleanouts:

12/21/2012

1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. MIFAB, Inc.
 - b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - c. Wade
2. Standard: ASME A112.36.2M for cast iron for cleanout test tee.
3. Size: Same as connected drainage piping
4. Body Material: Hubless, cast-iron soil pipe test tees required to match connected piping.
5. Closure: cast-iron plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
7. Closure: Stainless-steel plug with seal.

B. Cast-Iron Wall Cleanouts:

1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. MIFAB, Inc.
 - b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
 - c. Wade
2. Standard: ASME A112.36.2M. Include wall access.
3. Size: Same as connected drainage piping.
4. Body: Hubless, cast-iron soil pipe test tee as required to match connected piping.
5. Closure: cast-iron plug.
6. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
7. Wall Access: Round, flat, chrome-plated brass or stainless-steel cover plate with screw.

C. Cleanout Schedule

<u>Location</u>	<u>Piping</u>	<u>Figure Number</u>
Wall	Exposed Cast Iron	Smith 4420 Wade W-8550E w/8480R MIFAB C1450
Wall	Exposed Steel	Smith 4470 Wade W-8590E w/8480R MIFAB C1430
Wall	Concealed Cast Iron	Smith 4532-U Wade W-8560E w/8480R MIFAB C1460-RD-6
Wall	Concealed Steel	Smith 4472-U Wade W-8590E w/8480R MIFAB C1430-RD-6
Floor-Concrete	Steel or Cast Iron	Smith 4248-U Wade W-6000Z MIFAB C1100-XR

Floor-General
Finished Area

Cast Iron

Smith 4028-U
Wade W-6000-1
MIFAB C1100

2.2 THROUGH-PENETRATION FIRESTOP ASSEMBLIES

A. Through-Penetration Firestop Assemblies:

1. Standard: UL 1479 assembly of sleeve and stack fitting with firestopping plug.
2. Size: Same as connected pipe.
3. Sleeve: Molded PVC plastic, of length to match slab thickness and with integral nailing flange on one end for installation in cast-in-place concrete slabs.
4. Stack Fitting: ASTM A 48/A 48M, gray-iron, hubless-pattern, wye branch with neoprene O-ring at base and gray-iron plug in thermal-release harness. Include PVC protective cap for plug.
5. Special Coating: Corrosion resistant on interior of fittings.

2.3 ROOF DRAINS

A. Metal Roof Drains:

1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. Josam Company; Josam Div., Model No. 21500-19-3-22-30-X
 - b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc., Model No. 1011-C-R-U
 - c. Wade, Model No. W-3000-DP-5-52-53-IC
 - d. Zurn Plumbing Products Group; Light Commercial Operation., Model No. ZC-100-84-C-R-VP
2. Standard: ASME A112.21.2M.
3. Pattern: Promenade-deck or Domed Roof drain
4. Body Material: Cast iron.
5. Flow-Control Weirs: Required.
6. Outlet: Bottom, Side.
7. Dome or Grate Material: Cast iron.
8. Extension Collars: Not required.
9. Underdeck Clamp: Required.
10. Sump Receiver: Not required.

2.4 FLASHING MATERIALS

- A. Zinc-Coated Steel Sheet: ASTM A 653/A 653M, with 0.20 percent copper content and 0.04-inch minimum thickness, unless otherwise indicated. Include G90 (Z275) hot-dip galvanized, mill-phosphatized finish for painting if indicated.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

- a. Jay R. Smith, Model no. 1740.
 - b. Josam, Model no. 26450.
 - c. MIFAB, Model no. MI-910.
 - d. Zurn, Model no. Z-196.
- B. Fasteners: Metal compatible with material and substrate being fastened.
- C. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.
- D. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic.

PART 3 - EXECUTION

3.1 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 (DN 100). Use NPS 4 (DN 100) 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 (DN 100) 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 roof drains at low points of roof areas according to roof membrane manufacturer's written installation instructions.
- 1. Install roof-drain flashing collar or flange so that there will be no leakage between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.
 - 2. Position roof drains for easy access and maintenance.
- E. Install sleeve flashing device with each riser and stack passing through floors with waterproof membrane.
- F. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

3.3 FLASHING INSTALLATION

- A. Fabricate flashing from single piece unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:
 - 1. Lead Sheets: Burn joints of lead sheets 6.0-lb/sq. ft. thickness or thicker. Solder joints of lead sheets 0.0625-inch thickness or thinner.
- B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
 - 1. Pipe Flashing: Sleeve type, matching pipe size, with minimum length of 10 inches, and skirt or flange extending at least 8 inches around pipe.
 - 2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches around sleeve.
- C. Set flashing on floors and roofs in solid coating of bituminous cement.
- D. Secure flashing into sleeve and specialty clamping ring or device.
- E. Fabricate and install flashing and pans, sumps, and other drainage shapes.

3.4 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 22 14 23

THIS PAGE LEFT INTENTIONALLY LEFT BLANK

SECTION 221429

SUMP PUMPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes the following sump pumps and accessories, inside the building, for building drainage systems:
 - 1. Submersible sump pumps.

1.3 SUBMITTALS

- A. Product Data: For each type and size of sump pump specified. Include certified performance curves with operating points plotted on curves, and rated capacities of selected models, furnished specialties, and accessories.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Operation and Maintenance Data: For each sump pump to include in emergency, operation, and maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5 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 rigging instructions for handling.

1.6 COORDINATION

- A. Coordinate size and location of concrete pits.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified, or approved equal.

2.2 SUBMERSIBLE SUMP PUMPS

- A. Manufacturers:
 - 1. Barnes; Crane Pumps & Systems.
 - 2. Bell & Gossett Domestic Pump; ITT Industries.
 - 3. Federal Pump Corp.
 - 4. Zoeller Company.
- B. Description: Factory-assembled and -tested, duplex, single-stage, centrifugal, end-suction, submersible, direct-connected sump pumps complying with UL 778 and HI 1.1-1.2 and HI 1.3 for submersible sump pumps.
- C. Casing: Cast-iron casing with metal inlet strainer and brass, bronze, or cast-iron impeller, legs that elevate pump to permit flow into impeller, and vertical discharge with companion flange suitable for piping connection.
- D. Impeller: Stainless steel or other corrosion-resistant material; statically and dynamically balanced, semiopen nonclog design, overhung, single suction, keyed and secured to shaft.
- E. Pump and Motor Shaft: Stainless steel, with factory-sealed, grease-lubricated ball bearings and double-mechanical seals.
- F. Motor: Hermetically sealed, capacitor-start type, with built-in overload protection; three-conductor waterproof power cable of length required, and with grounding plug and cable-sealing assembly for connection at pump.
 - 1. Moisture-Sensing Probe: Internal moisture sensor with moisture alarm.

- G. Pump Discharge Piping: Factory or field fabricated, ASTM A 53/A 53M, Schedule 40, galvanized-steel pipe.
- H. Pit Cover: Cast iron or steel with bituminous coating and strong enough to support controls.
- I. Controls: NEMA 250, Type 1 enclosure, pedestal-mounted float switch; with float, float rod, and rod buttons. Include automatic alternator to alternate operation of pump units on successive cycles and to operate multiple units if one pump cannot handle load.
- J. Provide auxiliary contacts in pump controllers for the following:
 - 1. Remote on-off status of each pump.
 - 2. Remote alarm status.
- K. Controls: NEMA 250, enclosure, pedestal-mounted float switch; with float, float rod, and rod buttons. Include automatic alternator to alternate operation of pump units on successive cycles and to operate multiple units if one pump cannot handle load.

2.3 SUMP PUMP PITS

- A. Description: Concrete pit with sump, pipe connections, curb frame, and separate cover.
- B. Sump: Construct of watertight, cast-in-place, reinforced concrete with sidewall openings for pipe connections.
 - 1. Pipe Connections: Sleeved openings large enough for mechanical sleeve seals for drainage piping.
- C. Curb Frame and Cover:
 - 1. Curb Frame Material: Galvanized steel or steel with bituminous coating.
 - a. Pattern: Angle-cross-section shape with flat top surface, prime painted.
 - 2. Cover: Fabricate with openings having gaskets, seals, and bushings, for access to pumps, pump shafts, control rods, discharge piping, vent connections, and power cables.
 - a. Material: steel with prime and final coats of paint.
 - b. Reinforcement: Steel or cast iron, capable of supporting foot traffic for pits installed in foot-traffic areas, prime painted.

2.4 FLEXIBLE CONNECTORS

- A. Manufacturers:
 - 1. Anamet, Inc.

2. Flex-Hose Co., Inc.
3. Flexicraft Industries.
4. Flex-Pression, Ltd.
5. Flex-Weld, Inc.

- B. Description: 125-psig minimum working-pressure rating and ends matching pump connection:
1. Stainless-Steel Flexible Connectors: Corrugated, stainless-steel inner tubing covered with stainless-steel wire braid. Include stainless-steel nipples or flanges, welded to tubing.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in of plumbing piping to verify actual locations of drainage piping connections before sump pump installation.

3.2 CONCRETE

- A. Install concrete bases of dimensions indicated for pumps and controllers.
1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around full perimeter of base.
 2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 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.

3.3 SUMP PUMP INSTALLATION

- A. Install pumps and arrange to provide access for maintenance including removal of motors, impellers, couplings, and accessories.
- B. Set submersible sump pumps on pit floor and adjust leg height accordingly. Make direct connections to drainage piping as shown on the plans.
- C. Construct sump pump pits and connect to drainage piping. Set pit curb frame recessed in and anchored to concrete. Fasten pit cover to pit curb flange. Install cover so top surface is flush with finished floor.
- D. Support piping so weight of piping is not supported by pumps.

3.4 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to sump pumps to allow service and maintenance.
- C. Connect drainage piping to pumps. Install discharge piping equal to or greater than size of pump discharge piping.
 - 1. Install flexible connectors adjacent to pumps in discharge piping.
 - 2. Install check and shutoff valves on discharge piping from each pump. Install unions on pumps having threaded pipe connections. Install valves same size as connected piping. Refer to Division 23 Section "Valves" for general-duty valves for drainage piping.
- D. Ground equipment according to Division 26.
- E. Connect wiring according to Division 26.

3.5 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. Verify bearing lubrication.
 - 3. Disconnect couplings and check motors for proper direction of rotation.
 - 4. Verify that each pump is free to rotate by hand. If pump is bound or drags, do not operate until cause of trouble is determined and corrected.
 - 5. Verify that pump controls are correct for required application.
- B. Start pumps without exceeding safe motor power:
 - 1. Start motors.
 - 2. Open discharge valves slowly.
 - 3. Check general mechanical operation of pumps and motors.
- C. Test and adjust controls and safeties.
- D. Remove and replace damaged and malfunctioning components.
 - 1. Pump Controls: Set pump controls for automatic start, stop, and alarm operation as required for system application.
 - 2. Set field-adjustable switches and circuit-breaker trip ranges as indicated, or if not indicated, for normal operation.
- E. 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 outside normal occupancy hours for this purpose.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train City of New York's maintenance personnel to adjust, operate, and maintain controls and pumps.

END OF SECTION 22 14 29

SECTION 223300

ELECTRIC WATER HEATERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes the following electric water heaters:
 - 1. Flow-control, instantaneous electric water heaters.
 - 2. Light-commercial electric water heaters.
 - 3. Water heater accessories.

1.3 SUBMITTALS

- A. Product Data: For each type and size of water heater indicated. Include rated capacities, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Product Certificates: For each type of instantaneous electric water heater, signed by product manufacturer.
- D. Manufacturer Seismic Qualification Certification: Submit certification that commercial water heaters, accessories, and components will withstand seismic forces. Include the following:
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - a. 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. 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.
- E. Source quality-control test reports.

- F. Field quality-control test reports.
- G. Operation and Maintenance Data: For electric water heaters to include in emergency, operation, and maintenance manuals.
- H. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain same type of electric water heaters through one source from a single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9," for all components that will be in contact with potable water.

1.5 COORDINATION

- A. Coordinate size and location of concrete bases with Architectural and Structural Drawings.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of electric water heaters that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Faulty operation of controls.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal use.
 - 2. Warranty Period(s): From date of Substantial Completion:
 - a. Instantaneous Electric Water Heaters: Five year(s).
 - b. Light-Commercial Electric Water Heaters: Five year(s).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified, or approved equal.

2.2 INSTANTANEOUS ELECTRIC WATER HEATERS

- A. Flow-Control, Instantaneous Electric Water Heaters: Comply with UL 499 for tankless electric (water heater) heating appliance.

1. Manufacturers:
 - a. Chronomite Laboratories, Inc.
 - b. Controlled Energy Corporation.
 - c. Eemax, Inc.
 - d. Hot Aqua, Inc.
 - e. IMI Waterheating, Ltd.
 - f. Stiebel Eltron, Inc.
2. Construction: Copper piping or tubing complying with NSF 61 barrier materials for potable water, without storage capacity.
 - a. Connections: ASME B1.20.1 pipe thread.
 - b. Pressure Rating: 150 psig.
 - c. Heating Element: Resistance heating system.
 - d. Temperature Control: Flow-control fitting.
 - e. Safety Control: High-temperature-limit cutoff device or system.
 - f. Jacket: Aluminum or steel with enameled finish or plastic.
3. Support: Bracket for wall mounting.
4. Capacity and Characteristics: refer to drawing schedules.

- B. Thermostat-Control, Instantaneous Electric Water Heaters: Comply with UL 499 for tankless electric (water heater) heating appliance.

1. Manufacturers:
 - a. Chronomite Laboratories, Inc.
 - b. IMI Waterheating, Ltd.
 - c. Keltech, Inc.
 - d. Niagara Industries, Inc.
2. Construction: Copper piping or tubing complying with NSF 61 barrier materials for potable water, without storage capacity.
 - a. Connections: ASME B1.20.1 pipe thread.
 - b. Pressure Rating: 150 psig (1035 kPa).
 - c. Heating Element: Resistance heating system.
 - d. Temperature Control: Thermostat.
 - e. Safety Control: High-temperature-limit cutoff device or system.

- f. Jacket: Aluminum or steel with enameled finish or plastic.
- 3. Support: Bracket for wall mounting.
- 4. Capacity and Characteristics: refer to drawing schedules.

2.3 LIGHT-COMMERCIAL ELECTRIC WATER HEATERS

- A. Description: Comply with UL 174 for household, storage electric water heaters.

1. Manufacturers:

- a. Bradford White Corporation.
- b. Rheem Water Heater Div.; Rheem Manufacturing Company.
- c. Ruud Water Heater Div.; Rheem Manufacturing Company.
- d. Smith, A. O. Water Products Company.
- e. State Industries, Inc.

2. Storage-Tank Construction: Steel, vertical arrangement.

- a. Tappings: ASME B1.20.1 pipe thread.
- b. Pressure Rating: 150 psig.
- c. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending lining material into tappings.

3. Factory-Installed Storage-Tank Appurtenances:

- a. Anode Rod: Replaceable magnesium.
- b. Dip Tube: Provide unless cold-water inlet is near bottom of tank.
- c. Drain Valve: ASSE 1005.
- d. Insulation: Comply with ASHRAE/IESNA 90.1 or ASHRAE 90.2.
- e. Jacket: Steel with enameled finish.
- f. Heat Trap Fittings: Inlet type in cold-water inlet and outlet type in hot-water outlet.
- g. Heating Elements: Two; electric, screw-in immersion type; wired for simultaneous operation, unless otherwise indicated.
- h. Temperature Control: Adjustable thermostat for each element.
- i. Safety Control: High-temperature-limit cutoff device or system.
- j. Relief Valve: ASME rated and stamped and complying with ASME PTC 25.3 for combination temperature and pressure relief valves. Include relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select relief valve with sensing element that extends into storage tank.

- 4. Special Requirements: NSF 5 construction with legs for off-floor installation.
- 5. Capacity and Characteristics: refer to drawing schedules.

2.4 WATER HEATER ACCESSORIES

- A. Water Heater Mounting Brackets: Water heater manufacturer's factory-fabricated steel bracket for wall mounting and capable of supporting water heater and water.
- B. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1 or ASHRAE 90.2.
- C. Water Regulators: ASSE 1003, water-pressure reducing valve. Set at 25-psig- (172.5-kPa-) maximum outlet pressure, unless otherwise indicated.

PART 3 - EXECUTION

3.1 WATER HEATER INSTALLATION

- A. Install commercial water heaters on concrete bases.
 - 1. Exception: Omit concrete bases for commercial water heaters if installation on stand, bracket, suspended platform, or direct on floor is indicated.
- B. Install water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
- C. Install seismic restraints for light-commercial and commercial water heaters. Anchor to substrate.
- D. Install combination temperature and pressure relief valves in water piping for water heaters without storage. Extend commercial-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.
- E. Install thermometer on outlet piping of water heaters.
- F. Install pressure gage(s) on inlet and outlet of commercial electric water- heater piping.
- G. Assemble and install inlet and outlet piping manifold kits for multiple water heaters. Fabricate, modify, or arrange manifolds for balanced water flow through each water heater. Include shutoff valve, thermometer in each water heater inlet and outlet, and throttling valve in each water heater outlet.
- H. Install water regulator, with integral bypass relief valve, in booster-heater inlet piping and water hammer arrester in booster-heater outlet piping.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to water heaters to allow service and maintenance. Arrange piping for easy removal of water heaters.
- C. Ground equipment according to "Grounding and Bonding."
- D. Connect wiring according to "Conductors and Cables."

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
- B. Perform the following field tests and inspections and prepare test reports:
 - 1. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
 - 2. Operational Test: After electrical circuitry has been energized, confirm proper operation.
 - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Remove and replace water heaters that do not pass tests and inspections and retest as specified above.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train City of New York's maintenance personnel to adjust, operate, and maintain instantaneous electric water heaters.

END OF SECTION 22 33 00

SECTION 224000

PLUMBING FIXTURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes the following conventional plumbing fixtures and related components:

- 1. Faucets for lavatories and sinks.
- 2. Protective shielding guards.
- 3. Fixture supports.
- 4. Water closets.
- 5. Urinal.
- 6. Lavatories.
- 7. Commercial sinks.
- 8. Kitchen sinks.
- 9. Service sinks.
- 10. Dishwasher.

1.3 DEFINITIONS

- A. ABS: Acrylonitrile-butadiene-styrene plastic.
- B. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.
- C. Cast Polymer: Cast-filled-polymer-plastic material. This material includes cultured-marble and solid-surface materials.
- D. Cultured Marble: Cast-filled-polymer-plastic material with surface coating.
- E. Fitting: Device that controls the flow of water into or out of the plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, drains and tailpieces, and traps and waste pipes. Piping and general-duty valves are included where indicated.

- F. FRP: Fiberglass-reinforced plastic.
- G. PMMA: Polymethyl methacrylate (acrylic) plastic.
- H. PVC: Polyvinyl chloride plastic.
- I. Solid Surface: Nonporous, homogeneous, cast-polymer-plastic material with heat-, impact-, scratch-, and stain-resistance qualities.

1.4 SUBMITTALS

- A. Product Data: For each type of plumbing fixture indicated. Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports. Indicate materials and finishes, dimensions, construction details, and flow-control rates.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Operation and Maintenance Data: For plumbing fixtures to include in emergency, operation, and maintenance manuals.
- D. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain plumbing fixtures, faucets, and other components of each category through one source from a single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; for plumbing fixtures for people with disabilities.
- D. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.
- E. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.
- F. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.
- G. Comply with the following applicable standards and other requirements specified for plumbing fixtures:

1. Enameled, Cast-Iron Fixtures: ASME A112.19.1M.
2. Porcelain-Enameled, Formed-Steel Fixtures: ASME A112.19.4M.
3. Slip-Resistant Bathing Surfaces: ASTM F 462.
4. Solid-Surface-Material Lavatories and Sinks: ANSI/ICPA SS-1.
5. Stainless-Steel Commercial, Handwash Sinks: NSF 2 construction.
6. Stainless-Steel Residential Sinks: ASME A112.19.3.
7. Vitreous-China Fixtures: ASME A112.19.2M.
8. Water-Closet, Dual Flush,: ASME A112.19.2-200.

H. Comply with the following applicable standards and other requirements specified for lavatory and sink faucets:

1. Backflow Protection Devices for Faucets with Side Spray: ASME A112.18.3M.
2. Backflow Protection Devices for Faucets with Hose-Thread Outlet: ASME A112.18.3M.
3. Diverter Valves for Faucets with Hose Spray: ASSE 1025.
4. Faucets: ASME A112.18.1.
5. Hose-Connection Vacuum Breakers: ASSE 1011.
6. Hose-Coupling Threads: ASME B1.20.7.
7. Integral, Atmospheric Vacuum Breakers: ASSE 1001.
8. NSF Potable-Water Materials: NSF 61.
9. Pipe Threads: ASME B1.20.1.
10. Sensor-Actuated Faucets and Electrical Devices: UL 1951.
11. Supply Fittings: ASME A112.18.1.
12. Brass Waste Fittings: ASME A112.18.2.

1.6 WARRANTY

A. Special Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace components of whirlpools that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Structural failures of unit shell.
 - b. Faulty operation of controls, blowers, pumps, heaters, and timers.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal use.
2. Warranty Period for Commercial Applications: Three year(s) from date of Substantial Completion.

1.7 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Faucet Washers and O-Rings: Equal to 10 percent of amount of each type and size installed.

2. Faucet Cartridges and O-Rings: Equal to 10 percent of amount of each type and size installed.
3. Provide hinged-top wood or metal box, or individual metal boxes, with separate compartments for each type and size of extra materials listed above.
4. Dual flush Tank, Repair Kits: Equal to 10 percent of amount of each type installed, but no fewer than 2 of each type.
5. Water-Closet Tank, Repair Kits: Equal to 10 percent of amount of each type installed.
6. Toilet Seats: Equal to 10 percent of amount of each type installed.

PART 2 - PRODUCTS

2.1 LAVATORY FAUCETS

A. Lavatory Faucets:

1. Basis-of-Design Product: Subject to compliance with requirements, provide the product as noted in the Schedule indicated in Part 3 of the specifications or comparable product by one of the following:
 - a. American Standard, One
 - b. Grohe, Watercare 32216.
 - c. Hansgrohe, Axor Uno.
 - d. Approved equal.
2. Description: Single-control mixing valve. Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture holes; coordinate outlet with spout and fixture receptor.
 - a. Body Material: Commercial, solid brass.
 - b. Finish: Polished chrome plate.
 - c. Maximum Flow Rate: 0.5 gpm.
 - d. Inlet(s): NPS ½.
 - e. Operation: Self-closing, metering.
 - f. Drain.
 - g. Tempering Device: Mechanical.

2.2 SINK FAUCETS

A. Kitchen Sink Faucets:

1. Basis-of-Design Product: Subject to compliance with requirements, provide the product as noted in the Schedule indicated in Part 3 of the specifications, or comparable product by one of the following:
 - a. American Standard, One
 - b. Grohe, Watercare 32216.

- c. Hansgrohe, Axor Uno.
 - d. Approved equal.
2. Description: Kitchen faucet with spray, with stops in shanks, vacuum breaker, hose-thread outlet. Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture holes; coordinate outlet with spout and fixture receptor.
- a. Body Material: Commercial, solid brass.
 - b. Finish: Polished chrome plate.
 - c. Maximum Flow Rate: 2.2 gpm, unless otherwise indicated.
 - d. Mixing Valve: Two-lever handle.
 - e. Backflow Protection Device for Hose Outlet: Required.
 - f. Inlet(s): NPS ½.
 - g. Vacuum Breaker: Required.
 - h. Mounting: Deck.
 - i. Spout Type: Swing gooseneck spout E3 softflo aerator.
 - j. Operation: Quatum operating cartridges.

B. Service Sink Faucets:

1. Basis-of-Design Product: Subject to compliance with requirements, provide the product as noted in the Schedule indicated in Part 3 of the specifications, or comparable product by one of the following:
- a. American Standard, One
 - b. Grohe, Watercare 32216.
 - c. Hansgrohe, Axor Uno.
 - d. Approved equal.
2. Description: service sink faucet coordinate faucet inlets with supplies and fixture holes; coordinate outlet with spout and fixture receptor.
- a. Body Material: Commercial, solid brass.
 - b. Finish: chrome.
 - c. Maximum Flow Rate: 2.0 gpm, unless otherwise indicated.
 - d. Mixing Valve: Two-lever handle.
 - e. Inlet(s): NPS ½.
 - f. Vacuum Breaker: Required.
 - g. Mounting: Back.
 - h. Spout Type: L12 swing spout.

2.3 FLUSHOMETERS

A. Flushometers:

1. Basis-of-Design Product: Subject to compliance with requirements, provide the product as noted in the Schedule indicated in Part 3 of the specifications or a comparable product by one of the following:

- a. Coyne & Delany Co.
 - b. Sloan Valve Company.
 - c. TOTO USA, Inc.
 - d. Approved Equal.
2. Description: Flushometer for urinal-type fixture.
- a. PERMEX Synthetic Rubber Diaphragm with Dual Filtered Fixed Bypass.
 - b. 3/4" LPS Screwdriver Bak-Chek Angle Stop.
 - c. High backpressure vacuum breaker flush connection with one-piece bottom hex coupling nut.
 - d. High copper, low zinc brass castings.
 - e. Diaphragm, handle packing, stop seat and vacuum breaker.
 - f. Valve body, cover, tailpiece and control stop shall be in conformance with ASTM Alloy Classification for Semi-Red Brass Valve.
 - g. Consumption: 0.13 gal./flush (0.5 L/flush).

2.4 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Insul-Tect Products Co.; a Subsidiary of MVG Molded Products.
 - b. McGuire Manufacturing Co., Inc.
 - c. TCI Products.
 - d. TRUEBRO, Inc.
 - e. Approved equal.
2. Description: Manufactured plastic wraps for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

B. Protective Shielding Piping Enclosures:

1. Description: Manufactured plastic enclosure for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with ADA requirements.

2.5 FIXTURE SUPPORTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Josam Company.
2. MIFAB Manufacturing Inc.
3. Smith, Jay R. Mfg. Co.
4. Watts Drainage Products Inc.; a div. of Watts Industries, Inc.
5. Zurn Plumbing Products Group; Specification Drainage Operation.

B. Water-Closet Supports:

1. Description: floor mounting with flanged connection, bolts, and wax ring to suit watercloset.

C. Lavatory Supports:

1. Description: Type II, lavatory carrier with concealed arms and tie rod for wall-mounting, lavatory-type fixture. Include steel uprights with feet.
2. Accessible-Fixture Support: Include rectangular steel uprights.

D. Sink Supports:

1. Description: Type II, sink carrier with hanger plate, bearing studs, and tie rod for sink-type fixture. Include steel uprights with feet.

2.6 WATER CLOSETS

1. Basis-of-Design Product: Subject to compliance with requirements, provide the product as noted in the Schedule indicated in Part 3 of the specifications or a comparable product by one of the following:
 - a. Crane Plumbing.
 - b. Duravit.
 - c. Gerber.
2. Description: Accessible, floor-mounting, floor-outlet, vitreous-china fixture designed for push button operation.
 - a. Style: One piece.
 - 1) Height: Accessible.
 - 2) Design Consumption: 1.6 gal./flush.
 - 3) Color: White.
 - b. Supply: NPS 1/2 (DN 15) chrome-plated brass or copper with screwdriver stop.
 - c. Style: push button.
3. Description: Accessible, wall-mounting, back-outlet, dual flush vitreous-china fixture.
 - a. Style: One piece.
 - 1) Height: Accessible.
 - 2) Design Consumption: 1.6 gal./flush.
 - 3) Color: White.

2.7 URINALS

1. Basis-of-Design Product: Subject to compliance with requirements, provide the product as noted in the Schedule indicated in Part 3 of the specifications or a comparable product by one of the following:
 - a. American Standard Companies, Inc.
 - b. Sloan.
 - c. Duravit USA, Inc.
 - d. TOTO USA, Inc.
 - e. Approved Equal.
2. Description: Wall-mounting, back-outlet, vitreous-china fixture designed for flushometer valve operation.
 - a. Type: Washdown flushing action.
 - b. Integral flushing rim.
 - c. Design Consumption: 0.13 gal./flush (0.5 L/flush).
 - d. Color: White.
 - e. Supply Spud Size: NPS 3/4.
 - f. Outlet Size: NPS 2 (DN 50).
 - g. Fixture Support: Urinal chair carrier.

2.8 LAVATORIES

A. Lavatories:

1. Basis-of-Design Product: Subject to compliance with requirements, provide the product as noted in the Schedule indicated in Part 3 of the specifications, or comparable product by one of the following:
 - a. Duravit.
 - b. Nameeks.
 - c. Lacava.
 - d. Americal Standard.
 - e. Approved Equal.
2. Description: Accessible, wall or Wall-mounting, vitreous-china fixture.
 - a. Faucet Hole Punching: One hole.
 - b. Faucet Hole Location: Top.
 - c. Color: White.
 - d. Supplies: NPS 3/8 chrome-plated copper with stops.
 - e. Drain: Grid.
 - f. Drain Piping: NPS 1-1/4 by NPS 1-1/2 chrome-plated, cast-brass P-trap.
 - g. Protective Shielding Guard(s).
 - h. Fixture Support: Lavatory.

2.9 SERVICE SINKS

A. Kitchen Sinks:

1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings as noted in the Schedule indicated in Part 3 of the specifications, or an approved equal.
2. Description: One, Two, or Three-compartment, counter-mounting, stainless-steel service sink.
 - a. Metal Thickness: 0.050 inch.
 - b. Left Bowl:
 - 1) Drain: 3-1/2-inch grid with offset waste.
 - a) Location: Centered in bowl.
 - c. Right Bowl:
 - 1) Drain: 3-1/2-inch grid with offset waste.
 - a) Location: Centered in bowl.
 - d. Center Bowl:
 - 1) Drain: 3-1/2-inch grid with offset waste.
 - a) Location: Centered in bowl.
 - e. Sink Faucet.
 - f. Supplies: NPS 3/4 chrome-plated copper with stops.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before plumbing fixture installation.
- B. Examine cabinets, counters, floors, and walls for suitable conditions where fixtures will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.

- B. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.
 - 1. Use carrier supports with waste fitting and seal for back-outlet fixtures.
 - 2. Use carrier supports without waste fitting for fixtures with tubular waste piping.
 - 3. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.
- C. Install back-outlet, wall-mounting fixtures onto waste fitting seals and attach to supports.
- D. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.
- E. Install wall-mounting fixtures with tubular waste piping attached to supports.
- F. Install floor-mounting, back-outlet water closets attached to building floor substrate and wall bracket and onto waste fitting seals.
- G. Install counter-mounting fixtures in and attached to casework.
- H. Install fixtures level and plumb according to roughing-in drawings.
- I. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
 - 1. Use ball, gate, or globe valves if supply stops are not specified with fixture.
- J. Install trap and waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.
- K. Install push button valves for accessible water closets with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.
- L. Install toilet seats on water closets.
- M. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- N. Install water-supply flow-control fittings with specified flow rates in fixture supplies at stop valves.
- O. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
- P. Install traps on fixture outlets. Omit trap on fixtures with integral traps.
- Q. Install escutcheons at piping wall, ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings.

- R. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color.

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

3.4 PLUMBING FIXTURE SCHEDULE AND PLUMBING FITTINGS

PLUMBING FIXTURE SCHEDULE

ITEM	MANUFACTURER & PRODUCT NO.		QUANTITY
Single-bowl lavatory ADA Location: room 103, 113, 104, 208, 209, 308, 409, 411	Duravit	Foster series 041955	9
Floor Mounted Toilet (ADA) Location: room 208, 209, 308, 409, 411	American Standard	FloWise Dual Flush Right Height Elongat- ed Toilet finish: white	5
Wall Hung Toilet (ADA) Location: room 103,104, 113	Sloan	Dual Flush Model ST-2052- 1.6/1.1 finish: white	6
Wall Hung Urinal (ADA) Location: room 103	Sloan	Model WEUS- 1000.1001-0.13 Manual flushometer	1
Service sink Location: room 301	Reclaimed		

Service sink Location: room 408, 412	Custom-fabricated stainless steel utility sink with sediment trap	See drawings A104, A605 and specifica- tion section "055000 Miscellaneous Metals"	3
Drinking fountain Location: 101, 207	Filtrine	Non-Recessed Foun- tain, Model 90 finish: stainless	2
Location: 401	Filtrine	Recessed Fountain, Model 103 finish: stainless	1

PLUMBING FITTINGS

	ITEM	MANUFACTURER & PRODUCT NO.		QUANTITY
Lavatory Faucet Location: restroom 103, 104, 208, 209, 211, 308, 409, 411	Motion Sensor, self- activat- ing	American Standard	Selectronic, AC per- manent power model 6056.105 finish: solid brass	9
Service Sink Faucet Location: room 301, 408		Chicago Faucets	540-LDL12WXF finish: chrome	2
Water closet		Sloan	Dual-Flush Flushome- ter WES-115	5
Urinal		Sloan	PERMEX Synthetic Rubber Diaphragm with Dual Filtered Fixed Bypass	1

3.5 FIELD QUALITY CONTROL

- A. Verify that installed plumbing fixtures are categories and types specified for locations where installed.
- B. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.
- C. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.
- D. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.

3.6 ADJUSTING

- A. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.
- B. Replace washers and seals of leaking and dripping faucets and stops.

3.7 CLEANING

- A. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following: Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts. Remove sediment and debris from drains.
- B. After completing installation of exposed, factory-finished fixtures, faucets, and fittings, inspect exposed finishes and repair damaged finishes.

3.8 PROTECTION

- A. Provide protective covering for installed fixtures and fittings.
- B. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by City of New York.

END OF SECTION 22 40 00

SECTION 224700

DRINKING FOUNTAINS AND WATER COOLERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes the following water coolers and related components:
 - 1. Pressure water coolers.
 - 2. Fixture supports.

1.3 DEFINITIONS

- A. Accessible Water Cooler: Fixture that can be approached and used by people with disabilities.
- B. Cast Polymer: Dense, cast-filled-polymer plastic.
- C. Drinking Fountain: Fixture with nozzle for delivering stream of water for drinking.
- D. Fitting: Device that controls flow of water into or out of fixture.
- E. Fixture: Drinking fountain or water cooler unless one is specifically indicated.
- F. Remote Water Cooler: Electrically powered equipment for generating cooled drinking water.
- G. Water Cooler: Electrically powered fixture for generating and delivering cooled drinking water.

1.4 SUBMITTALS

- A. Product Data: For each fixture indicated. Include rated capacities, furnished specialties, and accessories.
- B. Shop Drawings: Diagram power, signal, and control wiring.
- C. Field quality-control test reports.

- D. Operation and Maintenance Data: For fixtures to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, and Public Law 101-336, "Americans with Disabilities Act"; for fixtures for people with disabilities.
- C. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.
- D. ARI Standard: Comply with ARI's "Directory of Certified Drinking Water Coolers" for style classifications.
- E. ARI Standard: Comply with ARI 1010, "Self-Contained, Mechanically Refrigerated Drinking-Water Coolers," for water coolers and with ARI's "Directory of Certified Drinking Water Coolers" for type and style classifications.
- F. ASHRAE Standard: Comply with ASHRAE 34, "Designation and Safety Classification of Refrigerants," for water coolers. Provide HFC 134a (tetrafluoroethane) refrigerant, unless otherwise indicated.

1.6 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Filter Cartridges: Equal to 10 percent of amount installed for each type and size indicated, but no fewer than 10 of each.

PART 2 - PRODUCTS

2.1 PRESSURE WATER COOLERS

- A. Basis-of-Design Product: Wall mounted rectangular drinking fountain. Receptor to be an integral 10" bowl. Fountain to be secured to wall by a concealed mounting plate. Overall fountain not to exceed 5-1/2".
 - 1. Description: Model 90, non-recessed fountain.

- a. Cabinet: All stainless steel.
- b. Bubbler: bubbler with integral push-button valve.
- c. Control: Push button.
- d. Supply: NPS 3/8 (DN 10) with ball, gate, or globe valve.
- e. Drain: Grid with NPS 1-1/4 (DN 32) minimum horizontal waste and trap complying with ASME A112.18.2.
- f. Support: Mounting plate in wall 1/4" steel plate to be 10-3/4" high for vertical stability and 15-3/4" wide.

2. Description: Model 103 fully recessed.

- a. Cabinet: All stainless steel.
- b. Bubbler: One, with integral push-button valve, located on deck.
- c. Control: Push button.
- d. Supply: NPS 3/8 (DN 10) with ball, gate, or globe valve.
- e. Filter: One or more water filters complying with NSF 42 and NSF 53 for cyst and lead reduction to below EPA standards; with capacity sized for unit peak flow rate.
- f. Drain: Grid with NPS 1-1/4 (DN 32) minimum horizontal waste and trap complying with ASME A112.18.2.
- g. Dedicated drinking water filtered, sterilized and cooled.
- h. Support: Fully recessed without seams, exposed edges or screws.

B. Water Coolers:

- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
 - a. Elkay Manufacturing Co.
 - b. Halsey Taylor.
 - c. Filtrine.
 - d. Approved Equal.

2.2 FIXTURE SUPPORTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:

- 1. Josam Co.
- 2. MIFAB Manufacturing, Inc.
- 3. Smith, Jay R. Mfg. Co.

B. Description: ASME A112.6.1M, water cooler carriers. Include vertical, steel uprights with feet and tie rods and bearing plates with mounting studs matching fixture to be supported.

- 1. Type I: Hanger-type carrier with two vertical uprights.
- 2. Type II: Bilevel, hanger-type carrier with three vertical uprights.
- 3. Supports for Accessible Fixtures: Include rectangular, vertical, steel uprights instead of steel pipe uprights.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in for water and waste piping systems to verify actual locations of piping connections before fixture installation. Verify that sizes and locations of piping and types of supports match those indicated.
- B. Examine walls and floors for suitable conditions where fixtures are to be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

- A. Use carrier off-floor supports for wall-mounting fixtures, unless otherwise indicated.
- B. Use mounting frames for recessed water coolers, unless otherwise indicated.
- C. Set freestanding and pedestal drinking fountains on floor.
- D. Set remote water coolers on floor, unless otherwise indicated.
- E. Use chrome-plated brass or copper tube, fittings, and valves in locations exposed to view. Plain copper tube, fittings, and valves may be used in concealed locations.

3.3 INSTALLATION

- A. Install off-floor supports affixed to building substrate and attach wall-mounting fixtures, unless otherwise indicated.
- B. Install mounting frames affixed to building construction and attach recessed water coolers to mounting frames, unless otherwise indicated.
- C. Install fixtures level and plumb. For fixtures indicated for children, install at height required by authorities having jurisdiction.
- D. Install water-supply piping with shutoff valve on supply to each fixture to be connected to water distribution piping. Use ball, gate, or globe valve. Install valves in locations where they can be easily reached for operation.
- E. Install trap and waste piping on drain outlet of each fixture to be connected to sanitary drainage system.
- F. Install pipe escutcheons at wall penetrations in exposed, finished locations. Use deep-pattern escutcheons where required to conceal protruding pipe fittings.

- G. Seal joints between fixtures and walls and floors using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color.

3.4 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
- C. Ground equipment according to Division 26.
- D. Connect wiring according to Division 26.

3.5 FIELD QUALITY CONTROL

- A. Water Cooler Testing: After electrical circuitry has been energized, test for compliance with requirements. Test and adjust controls and safeties.
 - 1. Remove and replace malfunctioning units and retest as specified above.
 - 2. Report test results in writing.

3.6 ADJUSTING

- A. Adjust fixture flow regulators for proper flow and stream height.
- B. Adjust water cooler temperature settings.

3.7 CLEANING

- A. After completing fixture installation, 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.

END OF SECTION 22 47 00

THIS PAGE LEFT INTENTIONALLY LEFT BLANK

SECTION 226314

FACILITY NATURAL-GAS PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Pipes, tubes, and fittings.
 - 2. Piping specialties.
 - 3. Piping and tubing joining materials.
 - 4. Valves.
 - 5. Mechanical sleeve seals.

1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

1.4 PERFORMANCE REQUIREMENTS

- A. Minimum Operating-Pressure Ratings:
 - 1. Piping and Valves: 100 psig minimum unless otherwise indicated.
 - 2. Service Regulators: 65 psig minimum unless otherwise indicated.
 - 3. Minimum Operating Pressure of Service Meter: 5 psig.

- B. Natural-Gas System Pressure within Buildings: 0.5 psig.
- C. Delegated Design: Design restraints and anchors for natural-gas piping and equipment, including comprehensive analysis by a qualified professional engineer licensed in the State of New York, using performance requirements and design criteria indicated.

1.5 SUBMITTALS

- A. Product Data: For each type of the following:
 - 1. Piping specialties.
 - 2. Corrugated, stainless-steel tubing with associated components.
 - 3. Valves. Include pressure rating, capacity, settings, and electrical connection data of selected models.
 - 4. Pressure regulators. Indicate pressure ratings and capacities.
 - 5. Dielectric fittings.
 - 6. Mechanical sleeve seals.
 - 7. Escutcheons.
- B. Shop Drawings: For facility natural-gas piping layout. Include plans, piping layout and elevations, sections, and details for fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides, expansion joints and loops, and attachments of the same to building structure. Detail location of anchors, alignment guides, and expansion joints and loops.
 - 1. Shop Drawing Scale: 1/4 inch per foot (1:50).
 - 2. Detail mounting, supports, and valve arrangements for service meter assembly and pressure regulator assembly.
- C. Delegated-Design Submittal: For natural-gas piping and equipment indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional professional engineer licensed in the State of New York responsible for their preparation.
 - 1. Detail fabrication and assembly of seismic restraints.
 - 2. Design Calculations: Calculate requirements for selecting seismic restraints.
- D. Coordination Drawings: Plans and details, drawn to scale, on which natural-gas piping is shown and coordinated with other installations, using input from installers of the items involved.
- E. Site Survey: Plans, drawn to scale, on which natural-gas piping is shown and coordinated with other services and utilities.
- F. Qualification Data: For qualified professional professional engineer licensed in the State of New York.
- G. Welding certificates.

- H. Field quality-control reports.
- I. Operation and Maintenance Data: For motorized gas valves to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.
- 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.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Handling Flammable Liquids: Remove and dispose of liquids from existing natural-gas piping according to requirements of authorities having jurisdiction.
- B. Deliver pipes and tubes 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.
- C. Store and handle pipes and tubes having factory-applied protective coatings to avoid damaging coating, and protect from direct sunlight.

1.8 PROJECT CONDITIONS

- A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.
- B. Interruption of Existing Natural-Gas Service: Do not interrupt natural-gas service to facilities occupied by City of New York or others unless permitted under the following conditions and then only after arranging to provide purging and startup of natural-gas supply according to requirements indicated:
 - 1. Notify City of New York no fewer than two days in advance of proposed interruption of natural-gas service.

1.9 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided.

- B. Coordinate requirements for access panels and doors for valves installed concealed behind finished surfaces.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

- A. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
 - 1. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
 - 2. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.

2.2 PIPING SPECIALTIES

- A. Appliance Flexible Connectors:
 - 1. Indoor, Fixed-Appliance Flexible Connectors: Comply with ANSI Z21.24.
 - 2. Indoor, Movable-Appliance Flexible Connectors: Comply with ANSI Z21.69.
 - 3. Outdoor, Appliance Flexible Connectors: Comply with ANSI Z21.75.
 - 4. Operating-Pressure Rating: 0.5 psig.
 - 5. End Fittings: Zinc-coated steel.
 - 6. Threaded Ends: Comply with ASME B1.20.1.
 - 7. Maximum Length: 72 inches.
- B. Y-Pattern Strainers:
 - 1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
 - 2. End Connections: Threaded ends for NPS 2 (DN 50) and smaller; flanged ends for NPS 2-1/2 (DN 65) and larger.
 - 3. Strainer Screen: 40-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
 - 4. CWP Rating: 125 psig.
- C. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.

2.3 JOINING MATERIALS

- A. Joint Compound and Tape: Suitable for natural gas.

2.4 MANUAL GAS SHUTOFF VALVES

A. General Requirements for Metallic Valves, NPS 2 (DN 50) and Smaller: Comply with ASME B16.33.

1. CWP Rating: 125 psig.
2. Threaded Ends: Comply with ASME B1.20.1.
3. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
4. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
5. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves 1 inch and smaller.
6. Service Mark: Valves 1-1/4 inches to NPS 2 (DN 50) shall have initials "WOG" permanently marked on valve body.

B. One-Piece, Bronze Ball Valve with Bronze Trim: MSS SP-110.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
 - a. BrassCraft Manufacturing Company; a Masco company.
 - b. Conbraco Industries, Inc.; Apollo Div.
 - c. Lyall, R. W. & Company, Inc.
2. Body: Bronze, complying with ASTM B 584.
3. Ball: Chrome-plated brass.
4. Stem: Bronze; blowout proof.
5. Seats: Reinforced TFE; blowout proof.
6. Packing: Separate packnut with adjustable-stem packing threaded ends.
7. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
8. CWP Rating: 600 psig.
9. Listing: Valves NPS 1 (DN 25) and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

C. Cast-Iron, Lubricated Plug Valves: MSS SP-78.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
 - a. Flowserve.
 - b. Homestead Valve; a division of Olson Technologies, Inc.
 - c. McDonald, A. Y. Mfg. Co.
 - d. Milliken Valve Company.
2. Body: Cast iron, complying with ASTM A 126, Class B.

3. Plug: Bronze or nickel-plated cast iron.
4. Seat: Coated with thermoplastic.
5. Stem Seal: Compatible with natural gas.
6. Ends: Threaded or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
7. Operator: Square head or lug type with tamperproof feature where indicated.
8. Pressure Class: 125 psig.
9. Listing: Valves NPS 1 (DN 25) and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
10. Service: Suitable for natural-gas service with "WOG" indicated on valve body.

2.5 PRESSURE REGULATORS

A. General Requirements:

1. Single stage and suitable for natural gas.
2. Steel jacket and corrosion-resistant components.
3. Elevation compensator.
4. End Connections: Threaded for regulators NPS 2 (DN 50) and smaller; flanged for regulators NPS 2-1/2 (DN 65) and larger.

B. Service Pressure Regulators: Comply with ANSI Z21.80.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following, or approved equal:
 - a. Actaris.
 - b. American Meter Company.
 - c. Fisher Control Valves and Regulators; Division of Emerson Process Management.
2. Body and Diaphragm Case: Cast iron or die-cast aluminum.
3. Springs: Zinc-plated steel; interchangeable.
4. Diaphragm Plate: Zinc-plated steel.
5. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
6. Orifice: Aluminum; interchangeable.
7. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
8. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.
9. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
10. Overpressure Protection Device: Factory mounted on pressure regulator.
11. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.
12. Maximum Inlet Pressure: 100 psig.

C. Line Pressure Regulators: Comply with ANSI Z21.80.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following, or approved equal:
 - a. Actaris.
 - b. American Meter Company.
 - c. Eclipse Combustion, Inc.
 - d. Fisher Control Valves and Regulators; Division of Emerson Process Management.
 2. Body and Diaphragm Case: Cast iron or die-cast aluminum.
 3. Springs: Zinc-plated steel; interchangeable.
 4. Diaphragm Plate: Zinc-plated steel.
 5. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
 6. Orifice: Aluminum; interchangeable.
 7. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
 8. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.
 9. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
 10. Overpressure Protection Device: Factory mounted on pressure regulator.
 11. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.
 12. Maximum Inlet Pressure: 2 psig.
- D. Appliance Pressure Regulators: Comply with ANSI Z21.18.
1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following, or approved equal:
 - a. Canadian Meter Company Inc.
 - b. Eaton Corporation; Controls Div.
 - c. Harper Wyman Co.
 - d. Maxitrol Company.
 2. Body and Diaphragm Case: Die-cast aluminum.
 3. Springs: Zinc-plated steel; interchangeable.
 4. Diaphragm Plate: Zinc-plated steel.
 5. Seat Disc: Nitrile rubber.
 6. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
 7. Factory-Applied Finish: Minimum three-layer polyester and polyurethane paint finish.
 8. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.
 9. Maximum Inlet Pressure: 1 psig.

2.6 SERVICE METERS

- A. Service Meters and Service-Meter Bypass Fittings shall be provided by the local Utility Company.

2.7 DIELECTRIC FITTINGS

A. Dielectric Unions:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
 - a. Capitol Manufacturing Company.
 - b. Central Plastics Company.
 - c. Hart Industries International, Inc.
 - d. McDonald, A. Y. Mfg. Co.
 - e. Watts Regulator Co.; Division of Watts Water Technologies, Inc.
 - f. Wilkins; Zurn Plumbing Products Group.
2. Minimum Operating-Pressure Rating: 150 psig.
3. Combination fitting of copper alloy and ferrous materials.
4. Insulating materials suitable for natural gas.
5. Combination fitting of copper alloy and ferrous materials with threaded, brazed-joint, plain, or welded end connections that match piping system materials.

2.8 SLEEVES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

2.9 MECHANICAL SLEEVE SEALS

- A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
 - a. Advance Products & Systems, Inc.
 - b. Calpico Inc.
 - c. Metraflex Company (The).
 2. Sealing Elements: interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe and sleeve.
 3. Pressure Plates: Carbon steel.
 4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one nut and bolt for each sealing element.

2.10 ESCUTCHEONS

- A. General Requirements for Escutcheons: Manufactured wall and ceiling escutcheons and floor plates, with ID to fit around pipe or tube, and OD that completely covers opening.
- B. One-Piece, Deep-Pattern Escutcheons: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Escutcheons: With set screw.
 - 1. Finish: Polished chrome-plated or rough brass.

2.11 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 - 1. Characteristics: Post-hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - 2. Design Mix: 5000-psi, 28-day compressive strength.
 - 3. Packaging: Premixed and factory packaged.

2.12 LABELING AND IDENTIFYING

- A. Detectable Warning Tape: Acid- and alkali-resistant, PE film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored yellow.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in for natural-gas piping system to verify actual locations of piping connections before equipment installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Close equipment shutoff valves before turning off natural gas to premises or piping section.

- B. Inspect natural-gas piping according to the International Fuel Gas Code to determine that natural-gas utilization devices are turned off in piping section affected.
- C. Comply with the International Fuel Gas Code requirements for prevention of accidental ignition.

3.3 OUTDOOR PIPING INSTALLATION

- A. Comply with the International Fuel Gas Code for installation and purging of natural-gas piping.
- B. Install underground, natural-gas piping buried at least 36 inches below finished grade.
- C. Steel Piping with Protective Coating:
 - 1. Apply joint cover kits to pipe after joining to cover, seal, and protect joints.
 - 2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
 - 3. Replace pipe having damaged PE coating with new pipe.
- D. Install fittings for changes in direction and branch connections.
- E. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 - 1. Install steel pipe for sleeves smaller than 6 inches in diameter.
 - 2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
- F. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- G. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- H. Install pressure gage upstream and downstream from each service regulator.

3.4 INDOOR PIPING INSTALLATION

- A. Comply with the International Fuel Gas Code for installation and purging of natural-gas piping.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. 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.

- C. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.
- 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. Locate valves for easy access.
- H. Install natural-gas piping at uniform grade of 2 percent down toward drip and sediment traps.
- I. Install piping free of sags and bends.
- J. Install fittings for changes in direction and branch connections.
- K. Install escutcheons at penetrations of interior walls, ceilings, and floors.
 - 1. New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
 - c. Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
 - d. Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
 - e. Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type and set screw.
 - f. Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished chrome-plated finish.
 - g. Piping in Unfinished Service Spaces: One-piece, stamped-steel type with concealed or exposed-rivet hinge and set screw or spring clips.
 - h. Piping in Equipment Rooms: One-piece, cast-brass type.
 - i. Piping in Equipment Rooms: One-piece, stamped-steel type with set screw or spring clips.
 - j. Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.
 - L. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials.

- M. Verify final equipment locations for roughing-in.
- N. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.
- O. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.
 - 1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.
- P. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.
- Q. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels unless indicated to be exposed to view.
- R. Concealed Location Installations: Except as specified below, install concealed natural-gas piping and piping installed under the building in containment conduit constructed of steel pipe with welded joints as described in Part 2. Install a vent pipe from containment conduit to outdoors and terminate with weatherproof vent cap.
 - 1. Above Accessible Ceilings: Natural-gas piping, fittings, valves, and regulators may be installed in accessible spaces without containment conduit.
 - 2. In Walls or Partitions: Protect tubing installed inside partitions or hollow walls from physical damage using steel striker barriers at rigid supports.
 - 3. Prohibited Locations:
 - a. Do not install natural-gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
 - b. Do not install natural-gas piping in solid walls or partitions.
- S. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
- T. Connect branch piping from top or side of horizontal piping.
- U. Install unions in pipes NPS 2 (DN 50) and smaller, adjacent to each valve, at final connection to each piece of equipment. Unions are not required at flanged connections.
- V. Do not use natural-gas piping as grounding electrode.
- W. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.

- X. Install pressure gage upstream and downstream from each line regulator.

3.5 SERVICE-METER ASSEMBLY INSTALLATION

- A. Service-meter assemblies and piping to street main shall be by the local utility.

3.6 VALVE INSTALLATION

- A. Install manual gas shutoff valve for each gas appliance ahead of stainless-steel tubing connector.
- B. Install underground valves with valve boxes.
- C. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.
- D. Install earthquake valves aboveground outside buildings according to listing.

3.7 PIPING JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Threaded Joints:
 - 1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
 - 2. Cut threads full and clean using sharp dies.
 - 3. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
 - 4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.
 - 5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

3.8 HANGER AND SUPPORT INSTALLATION

- A. Install seismic restraints on piping.
- B. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:
 - 1. NPS 1 (DN 25) and Smaller: Maximum span, 96 inches; minimum rod size, 3/8 inch.
 - 2. NPS 1-1/4 (DN 32): Maximum span, 108 inches; minimum rod size, 3/8 inch.

3. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): Maximum span, 108 inches; minimum rod size, 3/8 inch.
4. NPS 2-1/2 to NPS 3-1/2 (DN 65 to DN 90): Maximum span, 10 feet; minimum rod size, 1/2 inch.

3.9 CONNECTIONS

- A. Connect to utility's gas main according to utility's procedures and requirements.
- B. Install natural-gas piping electrically continuous, and bonded to gas appliance equipment grounding conductor of the circuit powering the appliance according to NFPA 70.
- C. Install piping adjacent to appliances to allow service and maintenance of appliances.
- D. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within 72 inches of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.
- E. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

3.10 LABELING AND IDENTIFYING

- A. Install detectable warning tape directly above gas piping, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.11 PAINTING

- A. Comply with requirements in painting Sections for painting interior and exterior natural-gas piping.
- B. Paint exposed, exterior metal piping, valves, service regulators, service meters and meter bars, earthquake valves, and piping specialties, except components, with factory-applied paint or protective coating.
 1. Alkyd System: MPI EXT 5.1D.
 - a. Prime Coat: Alkyd anticorrosive metal primer.
 - b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - c. Topcoat: Exterior alkyd enamel flat.
 - d. Color: Gray.
- C. Paint exposed, interior metal piping, valves, service regulators, service meters and meter bars, earthquake valves, and piping specialties, except components, with factory-applied paint or protective coating.

1. Latex Over Alkyd Primer System: MPI INT 5.1Q.

- a. Prime Coat: Alkyd anticorrosive metal primer.
- b. Intermediate Coat: Interior latex matching topcoat.
- c. Topcoat: Interior latex flat.
- d. Color: Gray.

- D. Damage and Touchup: Repair marred and damaged factory-applied finishes with materials and by procedures to match original factory finish.

3.12 FIELD QUALITY CONTROL

- A. Perform tests and inspections.

- B. Tests and Inspections:

- 1. Test, inspect, and purge natural gas according to the International Fuel Gas Code and authorities having jurisdiction.

- C. Natural-gas piping will be considered defective if it does not pass tests and inspections.

- D. Prepare test and inspection reports.

3.13 DEMONSTRATION

- A. Engage a factory-authorized service representative to train City of New York's maintenance personnel to adjust, operate, and maintain earthquake valves.

3.14 OUTDOOR PIPING SCHEDULE

- A. Underground natural-gas piping shall be the following:

- 1. Steel pipe with wrought-steel fittings and welded joints, or mechanical couplings. Coat pipe and fittings with protective coating for steel piping.

- B. Aboveground natural-gas piping shall be the following:

- 1. Steel pipe with malleable-iron fittings and threaded joints.

3.15 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES LESS THAN 0.5 PSIG.

- A. Aboveground, branch piping NPS 1 (DN 25) and smaller shall be the following:

- 1. Steel pipe with malleable-iron fittings and threaded joints.

B. Aboveground, NPS 1 (DN 25) and larger distribution piping shall be the following:

1. Steel pipe with malleable-iron fittings and threaded joints.

3.16 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

A. Valves for pipe sizes NPS 2 (DN 50) and smaller at service meter shall be the following:

1. Bronze plug valve.

B. Valves for pipe sizes NPS 2-1/2 (DN 65) and larger at service meter shall be the following:

1. Cast-iron, nonlubricated plug valve.

C. Distribution piping valves for pipe sizes NPS 2 (DN 50) and smaller shall be the following:

1. Bronze plug valve.

D. Distribution piping valves for pipe sizes NPS 2-1/2 (DN 65) and larger shall be the following:

1. Cast-iron, nonlubricated plug valve.

E. Valves in branch piping for single appliance shall be the following:

1. Bronze plug valve.

END OF SECTION 22 63 14

SECTION 230513

COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.3 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 GENERAL MOTOR REQUIREMENTS

- A. Comply with requirements in this Section except when stricter requirements are specified in HVAC equipment schedules or Sections.
- B. Comply with NEMA MG 1 unless otherwise indicated.
- C. Comply with IEEE 841 for severe-duty motors.

2.2 MOTOR CHARACTERISTICS

- A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 feet (1000 m) above sea level.

- B. 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.

2.3 POLYPHASE MOTORS

- A. Description: NEMA MG 1, Design B, medium induction motor.
- B. Efficiency: Energy efficient, as defined in NEMA MG 1.
- C. Service Factor: 1.15.
- D. Rotor: Random-wound, squirrel cage.
- E. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
- F. Temperature Rise: Match insulation rating.
- G. Insulation: Class F.
- H. Code Letter Designation:
 - 1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
 - 2. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.
- I. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

- A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
- B. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

2.5 SINGLE-PHASE MOTORS

- A. Motors smaller than 1/2 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
 - 1. Permanent-split capacitor.
 - 2. Split phase.
 - 3. Capacitor start, inductor run.
 - 4. Capacitor start, capacitor run.
- B. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

- C. 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 shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 23 05 13

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 230514

COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.
- C. Division 1, Section 018113.3 – Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings.
- D. Division 1, Section 018113 – Sustainable Design Requirements (LEED Building)
- E. Division 1, Section 017419 - Construction Waste Management and Disposal
- F. Division 1, Section 018119 - Construction IAQ Requirements

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Piping materials and installation instructions common to most piping systems.
 - 2. Transition fittings.
 - 3. Dielectric fittings.
 - 4. Mechanical sleeve seals.
 - 5. Sleeves.
 - 6. Escutcheons.
 - 7. Grout.
 - 8. HVAC demolition.
 - 9. Equipment installation requirements common to equipment sections.
 - 10. Painting and finishing.
 - 11. Concrete bases.
 - 12. Supports and anchorages.

1.3 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.
- D. The following are industry abbreviations for rubber materials:
 - 1. EPDM: Ethylene-propylene-diene terpolymer rubber.
 - 2. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Transition fittings.
 - 2. Dielectric fittings.
 - 3. Mechanical sleeve seals.
 - 4. Escutcheons.
- B. Welding certificates.
- C. LEED BUILDING SUBMITTAL REQUIREMENTS:
 - 1. Provide for all field-applied adhesives, sealants (used as fillers), and paints:
Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, paints and coatings applied on the interior of the building. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

1.5 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
- B. Electrical Characteristics for HVAC Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting

electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

C. LEED BUILDING REQUIREMENTS

1. GENERAL REQUIREMENTS: The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.
2. PERFORMANCE CRITERIA: All field applied adhesives, sealants (used as fillers), prime painting, and finished painting shall comply with the low VOC requirements called out in Division 1, Section 018113.3 - Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, & Architectural Coatings, and Section 09900 - Interior Paint.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver pipes and tubes 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.

1.7 COORDINATION

- A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for HVAC installations.
- B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.
- C. Coordinate requirements for access panels and doors for HVAC items requiring access that are concealed behind finished surfaces.

1.8 WORK INCLUDED

- A. Related Work and Requirements Include:
 1. Requirements of Construction Waste Management, Section 017419.
 - a. The Commissioner has established that as many of the surplus and waste material as economically feasible shall be reused, salvaged, or recycled. To that end, the Contractor for Electrical Work shall participate in the development of the Waste Management Plan, and collect, sort and deposit in designated containers, their

waste, non-returned surplus materials and rubbish in accordance with the approved Plan.

- b. Project Diversion Goals are stated in Section 017419 – Construction Waste Management. The Contractor for Electrical Work shall meet or exceed the minimum percentage of waste stated there for diversion from landfill, unless the Contractor for General Construction Work designates a different amount. Specific items/categories shall be in accordance with the Documents and as established in the Plan.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified, or approved equal.

2.2 PIPE, TUBE, AND FITTINGS

- A. Refer to individual piping Sections for pipe, tube, and fitting materials and joining methods.

2.3 JOINING MATERIALS

- A. Refer to individual piping Sections for special joining materials not listed below.
- B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - 1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.
 - a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 - 2. AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- D. Brazing Filler Metals: Refer to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

2.4 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper alloy and ferrous materials with threaded, brazed-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.
- C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C).
 - 1. Manufacturers:
 - a. Capitol Manufacturing Co.
 - b. Central Plastics Company.
 - c. Eclipse, Inc.
 - d. Epco Sales, Inc.
 - e. Hart Industries, International, Inc.
 - f. Watts Industries, Inc.; Water Products Div.
 - g. Zurn Industries, Inc.; Wilkins Div.
- D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.
 - 1. Manufacturers:
 - a. Capitol Manufacturing Co.
 - b. Central Plastics Company.
 - c. Epco Sales, Inc.
 - d. Watts Industries, Inc.; Water Products Div.
- E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
 - 1. Manufacturers:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Central Plastics Company.
 - d. Pipeline Seal and Insulator, Inc.
 - 2. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig (1035- or 2070-kPa) minimum working pressure where required to suit system pressures.
- F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig (2070-kPa) minimum working pressure at 225 deg F (107 deg C).

1. Manufacturers:
 - a. Perfection Corp.
 - b. Precision Plumbing Products, Inc.
 - c. Sioux Chief Manufacturing Co., Inc.
 - d. Victaulic Co. of America.

2.5 MECHANICAL SLEEVE SEALS

- A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

1. Manufacturers:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Pipeline Seal and Insulator, Inc.
2. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Carbon steel. Include two for each sealing element.
4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.6 SLEEVES

- A. Galvanized-Steel Sheet: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.
- B. Copper or Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

2.7 ESCUTCHEONS

- A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
- B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
- C. One-Piece, Cast-Brass Type: With set screw. Polished chrome-plated.
- D. One-Piece, Stamped-Steel Type: With set screw and chrome-plated finish.

- E. One-Piece, Floor-Plate Type: Cast-iron floor plate.

2.8 GROUT

- A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 - 1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - 2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
 - 3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 HVAC DEMOLITION

- A. Refer to General Conditions Sections "Cutting and Patching" and "Selective Demolition" for general demolition requirements and procedures.
- B. Disconnect, demolish, and remove HVAC systems, equipment, and components indicated to be removed.
 - 1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - 2. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - 3. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - 4. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to City of New York.
- C. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

3.2 PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Install piping according to the following requirements and Sections specifying piping systems.
- B. 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 Coordination Drawings.
- C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

- 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 otherwise.
- 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. Select system components with pressure rating equal to or greater than system operating pressure.
- L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
 - 1. New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b. All Insulated Piping Passing Through Walls, Floors and Ceilings in Finished, Unfinished or Equipment Rooms: One-piece, stamped-steel type with spring clips.
- M. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
- N. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
 - 1. Cut sleeves to length for mounting flush with both surfaces.
 - a. Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 - 2. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 - 3. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. Steel Pipe Sleeves: For pipes smaller than NPS 6 (DN 150).
 - b. Steel Sheet Sleeves: For pipes NPS 6 (DN 150) and larger, penetrating gypsum-board partitions.

4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint.
- O. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Install steel pipe for sleeves smaller than 6 inches (150 mm) in diameter.
 2. Install cast-iron "wall pipes" for sleeves 6 inches (150 mm) and larger in diameter.
 3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- P. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- Q. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials.
- R. Verify final equipment locations for roughing-in.
- S. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.
- 3.3 PIPING JOINT CONSTRUCTION
- A. Join pipe and fittings according to the following requirements and Sections specifying piping systems.
 - B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 - C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
 - D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

- E. 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 unless dry seal threading is specified.
 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- F. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.4 PIPING CONNECTIONS

- A. Make connections according to the following, unless otherwise indicated:
1. Install unions, in piping NPS 2 (DN 50) and smaller, adjacent to each valve and at final connection to each piece of equipment.
 2. Install flanges, in piping NPS 2-1/2 (DN 65) and larger, adjacent to flanged valves and at final connection to each piece of equipment.
 3. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.5 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install HVAC equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

3.6 PAINTING

- A. Painting of HVAC systems, equipment, and components is specified in Sections "Interior Painting" and "Exterior Painting."
- B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.7 CONCRETE BASES

- A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
 - 1. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit.
 - 2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of the base.
 - 3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
 - 4. Place and secure anchorage devices. Use supported equipment manufacturer's 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.
 - 6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
 - 7. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete.

3.8 ERECTION OF METAL SUPPORTS AND ANCHORAGES

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor HVAC materials and equipment.
- B. Field Welding: Comply with AWS D1.1.

3.9 GROUTING

- A. Mix and install grout for HVAC equipment base bearing surfaces, pump and other equipment base plates, and anchors.
- B. Clean surfaces that will come into contact with grout.
- C. Provide forms as required for placement of grout.
- D. Avoid air entrapment during placement of grout.
- E. Place grout, completely filling equipment bases.
- F. Place grout on concrete bases and provide smooth bearing surface for equipment.
- G. Place grout around anchors.
- H. Cure placed grout.

3.10 WASTE MANAGEMENT AND DISPOSAL

- A. Comply with the requirements established by the Contractor for General Construction Work to separate and recycle, salvage or reuse cast-offs, surplus and waste material in accordance with the Waste Management Plan.
- B. Arrange for suppliers to take back shipping and packing materials for reuse or recycling to the maximum extent economically feasible, or include them in the Waste Management Plan.

END OF SECTION 23 05 14

SECTION 230515

ENCLOSED CONTROLLERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes ac, enclosed controllers rated 600 V and less, of the following types:
 - 1. Across-the-line, manual and magnetic controllers.
 - 2. Multispeed controllers.

1.3 SUBMITTALS

- A. Product Data: For each type of enclosed controller. Include dimensions and manufacturer's technical data on features, performance, electrical characteristics, ratings, and finishes.
- B. Shop Drawings: For each enclosed controller.
 - 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. Include the following:
 - a. Each installed unit's type and details.
 - b. Nameplate legends.
 - c. Short-circuit current rating of integrated unit.
 - d. UL listing for series rating of overcurrent protective devices in combination controllers.
 - e. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices in combination controllers.
 - 2. Wiring Diagrams: Power, signal, and control wiring.

- C. Coordination Drawings: Floor plans, drawn to scale, showing dimensioned layout, required working clearances, and required area above and around enclosed controllers where pipe and ducts are prohibited. Show enclosed controller layout and relationships between electrical components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Indicate field measurements.
- D. Qualification Data: For manufacturer and testing agency.
- E. Field quality-control test reports.
- F. Operation and Maintenance Data: For enclosed controllers to include in emergency, operation, and maintenance manuals. In addition to items specified in General Conditions Sections, include the following:
 - 1. Routine maintenance requirements for enclosed controllers and all installed components.
 - 2. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
- G. Load-Current and Overload-Relay Heater List: Compile after motors have been installed and arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.
- H. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed and arrange to demonstrate that dip switch settings for motor running overload protection suit actual motor to be protected.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer. Maintain, within 100 miles (160 km) of Project site, a service center capable of providing training, parts, and emergency maintenance and repairs.
- B. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
 - 1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Commissioning Technologies to supervise on-site testing specified in Part 3.
- C. Source Limitations: Obtain enclosed controllers of a single type through one source from a single manufacturer.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

- E. Comply with NFPA 70.
- F. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed controllers, minimum clearances between enclosed controllers, and for adjacent surfaces and other items. Comply with indicated maximum dimensions and clearances.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store enclosed controllers indoors in clean, dry space with uniform temperature to prevent condensation. Protect enclosed controllers from exposure to dirt, fumes, water, corrosive substances, and physical damage.
- B. If stored in areas subject to weather, cover enclosed controllers to protect them from weather, dirt, dust, corrosive substances, and physical damage. Remove loose packing and flammable materials from inside controllers; install electric heating of sufficient wattage to prevent condensation.

1.6 PROJECT CONDITIONS

- A. Interruption of Existing Electrical Service: Do not interrupt electrical 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 electrical service according to requirements indicated:
 - 1. Notify Commissioner and City of New York no fewer than two days in advance of proposed interruption of electrical service.
 - 2. Indicate method of providing temporary utilities.
 - 3. Do not proceed with interruption of electrical service without Commissioner's and City of New York's written permission.

1.7 COORDINATION

- A. Coordinate layout and installation of enclosed controllers with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases.
- C. Coordinate installation of roof curbs, equipment supports, and roof penetrations.
- D. Coordinate features of enclosed controllers and accessory devices with pilot devices and control circuits to which they connect.

- E. Coordinate features, accessories, and functions of each enclosed controller with ratings and characteristics of supply circuit, motor, required control sequence, and duty cycle of motor and load.

1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Spare Fuses: Furnish one spare for every five installed, but no fewer than one set of three of each type and rating.
 - 2. Indicating Lights: Two of each type installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal.
 - 1. ABB Power Distribution, Inc.; ABB Control, Inc. Subsidiary.
 - 2. Danfoss Inc.; Danfoss Electronic Drives Div.
 - 3. Eaton Corporation; Cutler-Hammer Products.
 - 4. General Electrical Company; GE Industrial Systems.
 - 5. Rockwell Automation; Allen-Bradley Co.; Industrial Control Group.
 - 6. Siemens/Furnas Controls.
 - 7. Square D.

2.2 ACROSS-THE-LINE ENCLOSED CONTROLLERS

- A. Manual Controller: NEMA ICS 2, general purpose, Class A, with toggle action and overload element.
- B. Magnetic Controller: NEMA ICS 2, Class A, full voltage, nonreversing, across the line, unless otherwise indicated.
 - 1. Control Circuit: 120 V; obtained from integral control power transformer with a control power transformer of sufficient capacity to operate connected pilot, indicating and control devices, plus 100 percent spare capacity.
 - 2. Overload Relay: Ambient-compensated type with inverse-time-current characteristic and NEMA ICS 2, Class 30 tripping characteristic. Provide with heaters or sensors in each phase matched to nameplate full-load current of specific motor to which they connect and with appropriate adjustment for duty cycle.

3. Adjustable Overload Relay: Dip switch selectable for motor running overload protection with NEMA ICS 2, Class 30 tripping characteristic, and selected to protect motor against voltage and current unbalance and single phasing. Provide relay with Class II ground-fault protection, with start and run delays to prevent nuisance trip on starting.
- C. Combination Magnetic Controller: Factory-assembled combination controller and disconnect switch.
1. Fusible Disconnecting Means: NEMA KS 1, heavy-duty, fusible switch with rejection-type fuse clips rated for fuses. Select and size fuses to provide Type 2 protection according to IEC 947-4-1, as certified by an NRTL.
 2. Nonfusible Disconnecting Means: NEMA KS 1, heavy-duty, nonfusible switch.
 3. Circuit-Breaker Disconnecting Means: NEMA AB 1, motor-circuit protector with field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.

2.3 MULTISPEED ENCLOSED CONTROLLERS

- A. Multispeed Enclosed Controller: Match controller to motor type, application, and number of speeds; include the following accessories:
1. Compelling relay to ensure that motor will start only at low speed.
 2. Accelerating relay to ensure properly timed acceleration through speeds lower than that selected.
 3. Decelerating relay to ensure automatically timed deceleration through each speed.

2.4 ENCLOSURES

- A. Description: Flush- or surface-mounting cabinets as indicated. NEMA 250, Type 1, unless otherwise indicated to comply with environmental conditions at installed location.
1. Outdoor Locations: NEMA 250, Type 3R.
 2. Kitchen Areas: NEMA 250, Type 4X, stainless steel.
 3. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
 4. Hazardous Areas: NEMA 250, Type 7C.

2.5 ACCESSORIES

- A. Devices shall be factory installed in controller enclosure, unless otherwise indicated.
- B. Push-Button Stations, Pilot Lights, and Selector Switches: NEMA ICS 2, heavy-duty type.
- C. Stop and Lockout Push-Button Station: Momentary-break, push-button station with a factory-applied hasp arranged so padlock can be used to lock push button in depressed position with control circuit open.

- D. Control Relays: Auxiliary and adjustable time-delay relays.
- E. Elapsed Time Meters: Heavy duty with digital readout in hours.
- F. Phase-Failure and Undervoltage Relays: Solid-state sensing circuit with isolated output contacts for hard-wired connection. Provide adjustable undervoltage setting.
- G. Current-Sensing, Phase-Failure Relays for Bypass Controllers: Solid-state sensing circuit with isolated output contacts for hard-wired connection; arranged to operate on phase failure, phase reversal, current unbalance of from 30 to 40 percent, or loss of supply voltage; with adjustable response delay.

2.6 FACTORY FINISHES

- A. Finish: Manufacturer's standard paint applied to factory-assembled and -tested enclosed controllers before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and surfaces to receive enclosed controllers for compliance with requirements, installation tolerances, and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

- A. Select features of each enclosed controller to coordinate with ratings and characteristics of supply circuit and motor; required control sequence; duty cycle of motor, controller, and load; and configuration of pilot device and control circuit affecting controller functions.
- B. Select horsepower rating of controllers to suit motor controlled.

3.3 INSTALLATION

- A. For control equipment at walls, bolt units to wall or mount on lightweight structural-steel channels bolted to wall.
- B. Enclosed Controller Fuses: Install fuses in each fusible switch.

3.4 IDENTIFICATION

- A. Identify enclosed controller, components, and control wiring according to Division 26 Section "Electrical Identification."

3.5 CONTROL WIRING INSTALLATION

- A. Install wiring between enclosed controllers according to Division 26.
- B. Bundle, train, and support wiring in enclosures.
- C. Connect hand-off-automatic switch and other automatic-control devices where applicable.
 - 1. Connect selector switches to bypass only manual- and automatic-control devices that have no safety functions when switch is in hand position.
 - 2. Connect selector switches with enclosed controller circuit in both hand and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.

3.6 CONNECTIONS

- A. Conduit installation requirements are specified in other Division 26 Sections. Drawings indicate general arrangement of conduit, fittings, and specialties.
- B. Ground equipment according to Division 26 Section "Grounding and Bonding."

3.7 FIELD QUALITY CONTROL

- A. Prepare for acceptance tests as follows:
 - 1. Test insulation resistance for each enclosed controller element, bus, component, connecting supply, feeder, and control circuit.
 - 2. Test continuity of each circuit.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to perform the following:
 - 1. Inspect controllers, wiring, components, connections, and equipment installation. Test and adjust controllers, components, and equipment.
 - 2. Assist in field testing of equipment including pretesting and adjusting of solid-state controllers.
 - 3. Report results in writing.

- C. Testing Agency: Engage a qualified testing and inspecting agency to perform the following field tests and inspections and prepare test reports:
 - 1. Perform each electrical test and visual and mechanical inspection, except optional tests, stated in NETA ATS, "Motor Control - Motor Starters." 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.

3.8 ADJUSTING

- A. Set field-adjustable switches and circuit-breaker trip ranges.

3.9 DEMONSTRATION

- A. Engage a factory-authorized service representative to train City of New York's maintenance personnel to adjust, operate, and maintain enclosed controllers.

END OF SECTION 23 05 15

SECTION 230516

EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Expansion compensators.
 - 2. Flexible-hose expansion joints.
 - 3. Pipe bends and loops.
 - 4. Alignment guides and anchors.

1.3 DEFINITIONS

- A. BR: Butyl rubber.
- B. Buna-N: Nitrile rubber.
- C. CR: Chlorosulfonated polyethylene synthetic rubber.
- D. CSM: Chlorosulfonyl-polyethylene rubber.
- E. EPDM: Ethylene-propylene-diene terpolymer rubber.
- F. NR: Natural rubber.
- G. PTFE: Polytetrafluoroethylene plastic.

1.4 PERFORMANCE REQUIREMENTS

- A. Compatibility: Products shall be suitable for piping system fluids, materials, working pressures, and temperatures.
- B. Capability: Products shall absorb 200 percent of maximum axial movement between anchors.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Certificates: For each type of pipe expansion joint, signed by product manufacturer.
- C. Maintenance Data: For pipe expansion joints to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. Steel Shapes and Plates: AWS D1.1, "Structural Welding Code - Steel."
 - 2. Welding to Piping: ASME Boiler and Pressure Vessel Code: Section IX.

PART 2 - PRODUCTS

2.1 EXPANSION JOINTS

- A. Expansion Compensators: Double-ply corrugated steel, stainless-steel, or copper-alloy bellows in a housing with internal guides, antitorque device, and removable end clip for positioning.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. Adesco Manufacturing, LLC.
 - b. Flexicraft Industries.
 - c. Flex-Pression, Ltd.
 - d. Flex-Weld, Inc.
 - e. Hyspan Precision Products, Inc.
 - f. Metraflex, Inc.
 - g. Senior Flexonics, Inc.; Pathway Division.
 - h. Unaflex Inc.
 - 2. Minimum Pressure Rating: 150 psig (1035 kPa), unless otherwise indicated.
 - 3. Configuration for Copper Piping: Two-ply phosphor-bronze or stainless-steel bellows and bronze or stainless-steel shroud.
 - 4. End Connections for Copper Tubing NPS 2 (DN 50) and Smaller: Brazed joint.
 - 5. End Connections for Copper Tubing NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Brazed joint.
- B. Flexible-Hose Expansion Joints: Manufactured assembly with two flexible-metal-hose legs joined by long-radius, 180-degree return bend or center section of flexible hose; with inlet and outlet elbow fittings, corrugated-metal inner hoses, and braided outer sheaths.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

- a. Flex-Hose Co., Inc.
 - b. Flexicraft Industries.
 - c. Flex-Pression, Ltd.
 - d. Metraflex, Inc.
2. Flexible-Hose Expansion Joints for Copper Piping: Copper-alloy fittings with Brazed-joint end connections.
- a. NPS 2 (DN 50) and Smaller: Bronze hoses and single-braid bronze sheaths with 450 psig at 70 deg F (3100 kPa at 21 deg C) and 340 psig at 450 deg F (2340 kPa at 232 deg C) ratings.
 - b. NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Stainless-steel hoses and single-braid, stainless-steel sheaths with 300 psig at 70 deg F (2070 kPa at 21 deg C) and 225 psig at 450 deg F (1550 kPa at 232 deg C) ratings.

2.2 ALIGNMENT GUIDES

- A. Description: Steel, factory fabricated, with bolted two-section outer cylinder and base for alignment of piping and two-section guiding spider for bolting to pipe.
1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - a. AdSCO Manufacturing, LLC.
 - b. Advanced Thermal Systems, Inc.
 - c. Flex-Hose Co., Inc.
 - d. Flexicraft Industries.
 - e. Flex-Weld, Inc.
 - f. Hyspan Precision Products, Inc.
 - g. Metraflex, Inc.
 - h. Piping Technology & Products, Inc.
 - i. Senior Flexonics, Inc.; Pathway Division.

2.3 MATERIALS FOR ANCHORS

- A. Steel Shapes and Plates: ASTM A 36/A 36M.
- B. Bolts and Nuts: ASME B18.10 or ASTM A 183, steel, hex head.
- C. Washers: ASTM F 844, steel, plain, flat washers.
- D. Mechanical Fasteners: Insert-wedge-type stud with expansion plug anchor for use in hardened portland cement concrete, and tension and shear capacities appropriate for application.
1. Stud: Threaded, zinc-coated carbon steel.
 2. Expansion Plug: Zinc-coated steel.
 3. Washer and Nut: Zinc-coated steel.

- E. Concrete: Portland cement mix, 3000 psi (20.7 MPa) minimum.
- F. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink, nonmetallic grout; suitable for interior and exterior applications.
 - 1. Properties: Nonstaining, noncorrosive, and nongaseous.
 - 2. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

PART 3 - EXECUTION

3.1 EXPANSION-JOINT INSTALLATION

- A. Install manufactured, nonmetallic expansion joints according to FSA's "Technical Handbook: Non-Metallic Expansion Joints and Flexible Pipe Connectors."
- B. Install expansion joints of sizes matching size of piping in which they are installed.
- C. Install alignment guides to allow expansion and to avoid end-loading and torsional stress.

3.2 PIPE BEND AND LOOP INSTALLATION

- A. Install pipe bends and loops cold-sprung in tension or compression as required to partly absorb tension or compression produced during anticipated change in temperature.
- B. Attach pipe bends and loops to anchors.
 - 1. Steel Anchors: Attach by welding. Comply with ASME B31.9 and ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

3.3 SWING CONNECTIONS

- A. Connect risers and branch connections to mains with at least five pipe fittings, including tee in main.
- B. Connect risers and branch connections to terminal units with at least four pipe fittings, including tee in riser.
- C. Connect mains and branch connections to terminal units with at least four pipe fittings, including tee in main.

3.4 ALIGNMENT-GUIDE INSTALLATION

- A. Install guides on piping adjoining pipe expansion fittings and loops.
- B. Attach guides to pipe and secure to building structure.

3.5 ANCHOR INSTALLATION

- A. Install anchors at locations to prevent stresses from exceeding those permitted by ASME B31.9 and to prevent transfer of loading and stresses to connected equipment.
- B. Fabricate and install steel anchors by welding steel shapes, plates, and bars to piping and to structure. Comply with ASME B31.9 and AWS D1.1.
- C. Construct concrete anchors of poured-in-place concrete of dimensions indicated and include embedded fasteners.
- D. Install pipe anchors according to expansion-joint manufacturer's written instructions if expansion joints or compensators are indicated.
- E. Use grout to form flat bearing surfaces for expansion fittings, guides, and anchors installed on or in concrete.

END OF SECTION 23 05 16

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 230517

SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Sleeves.
 - 2. Stack-sleeve fittings.
 - 3. Sleeve-seal systems.
 - 4. Sleeve-seal fittings.
 - 5. Grout.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

- A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.
- C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.
- D. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.
- E. Galvanized-Steel-Sheet Sleeves: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.

- F. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.
- G. Molded-PVC Sleeves: With nailing flange for attaching to wooden forms.

2.2 STACK-SLEEVE FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, , provide product indicated on Drawings or comparable product by one of the following:
 - 1. Smith, Jay R. Mfg. Co.
 - 2. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.
- C. Description: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring, bolts, and nuts for membrane flashing.
 - 1. Underdeck Clamp: Clamping ring with setscrews.

2.3 SLEEVE-SEAL SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Advance Products & Systems, Inc.
 - 2. CALPICO, Inc.
 - 3. Metraflex Company (The).
 - 4. Pipeline Seal and Insulator, Inc.
 - 5. Proco Products, Inc.
- C. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
 - 1. Sealing Elements: [EPDM-rubber] [NBR] interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - 2. Pressure Plates: [Carbon steel] [Plastic] [Stainless steel].
 - 3. Connecting Bolts and Nuts: [Carbon steel, with corrosion-resistant coating.] [Stainless steel] of length required to secure pressure plates to sealing elements.

2.4 SLEEVE-SEAL FITTINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Presealed Systems.
- C. Description: Manufactured plastic, sleeve-type, waterstop assembly made for imbedding in concrete slab or wall. Unit has plastic or rubber waterstop collar with center opening to match piping OD.

2.5 GROUT

- A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
- B. Characteristics: Nonshrink; recommended for interior and exterior applications.
- C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
- D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

- 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 (25-mm)] 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 (50 mm)] above finished floor level.

3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.
- 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 (6.4-mm) annular clear space between sleeve and pipe or pipe insulation.
 3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Division 07 Section "Joint Sealants."
- E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Division 07 Section "Penetration Firestopping."

3.2 STACK-SLEEVE-FITTING INSTALLATION

- A. Install stack-sleeve fittings in new slabs as slabs are constructed.
 1. Install fittings that are large enough to provide 1/4-inch (6.4-mm) 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 Division 07 Section "Sheet Metal Flashing and Trim."
 3. Install section of cast-iron soil pipe to extend sleeve to 2 inches (50 mm) 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 grout, seal the space around outside of stack-sleeve fittings.
- B. Fire-Barrier Penetrations: Maintain indicated fire rating of floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Division 07 Section "Penetration Firestopping."

3.3 SLEEVE-SEAL-SYSTEM INSTALLATION

- A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.
- B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, 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.

3.4 SLEEVE-SEAL-FITTING INSTALLATION

- A. Install sleeve-seal fittings in new walls and slabs as they are constructed.
- B. Assemble fitting components of length to be flush with both surfaces of concrete slabs and walls. Position waterstop flange to be centered in concrete slab or wall.
- C. Secure nailing flanges to concrete forms.
- D. Using grout, seal the space around outside of sleeve-seal fittings.

3.5 SLEEVE AND SLEEVE-SEAL SCHEDULE

- A. Use sleeves and sleeve seals for the following piping-penetration applications:
 - 1. Exterior Concrete Walls above Grade:
 - a. Piping Smaller Than NPS 6 DN 150, Cast-iron wall sleeves, Galvanized-steel wall sleeves, Galvanized-steel-pipe sleeves, Sleeve-seal fittings.
 - b. Piping NPS 6 DN 150 and Larger: Cast-iron wall sleeves, Galvanized-steel wall sleeves, Galvanized-steel-pipe sleeves.
 - 2. Exterior Concrete Walls below Grade:
 - a. Piping Smaller Than NPS 6 DN 150, Cast-iron wall sleeves with sleeve-seal system, Galvanized-steel wall sleeves with sleeve-seal system, Galvanized-steel-pipe sleeves with sleeve-seal system, Sleeve-seal fittings.
 - 1) Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.
 - b. Piping NPS 6 DN 150 and Larger: Cast-iron wall sleeves with sleeve-seal system, Galvanized-steel wall sleeves with sleeve-seal system, Galvanized-steel-pipe sleeves with sleeve-seal system.
 - 1) Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.
 - 3. Concrete Slabs-on-Grade:
 - a. Piping Smaller Than NPS 6 DN 150, Cast-iron wall sleeves with sleeve-seal system, Galvanized-steel wall sleeves with sleeve-seal system, Galvanized-steel-pipe sleeves with sleeve-seal system, Sleeve-seal fittings.
 - 1) Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.

- b. Piping NPS 6 DN 150 and Larger: Cast-iron wall sleeves with sleeve-seal system, Galvanized-steel wall sleeves with sleeve-seal system, Galvanized-steel-pipe sleeves with sleeve-seal system, Galvanized-steel-pipe sleeves.
 - 1) Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.
- 4. Concrete Slabs above Grade:
 - a. Piping Smaller Than NPS 6 DN 150, Galvanized-steel-pipe sleeves, PVC-pipe sleeves, Stack-sleeve fittings, Sleeve-seal fittings, Molded-PE or -PP sleeves, Molded-PVC sleeves.
 - b. Piping NPS 6 DN 150 and Larger: Galvanized-steel-pipe sleeves, PVC-pipe sleeves, Stack-sleeve fittings.
- 5. Interior Partitions:
 - a. Piping Smaller Than NPS 6 DN 150, Galvanized-steel-pipe sleeves, PVC-pipe sleeves.
 - b. Piping NPS 6 DN 150 and Larger: Galvanized-steel-sheet sleeves.

END OF SECTION 230517

SECTION 230519

METERS AND GAGES FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Thermometers.
 - 2. Gages.
 - 3. Test plugs.

1.3 DEFINITIONS

- A. CR: Chlorosulfonated polyethylene synthetic rubber.
- B. EPDM: Ethylene-propylene-diene terpolymer rubber.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated; include performance curves.
- B. Shop Drawings: Schedule for thermometers and gages indicating manufacturer's number, scale range, and location for each
- C. Product Certificates: For each type of thermometers and gages, signed by product manufacturer.

PART 2 - PRODUCTS

2.1 METAL-CASE, LIQUID-IN-GLASS THERMOMETERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Palmer - Wahl Instruments Inc.
 - 2. Trerice, H. O. Co.
 - 3. Weiss Instruments, Inc.
 - 4. Weksler Instruments Operating Unit; Dresser Industries; Instrument Div.
- B. Case: Brass, 9 inches (229 mm) long.
- C. Tube: Red or blue reading, mercury filled, with magnifying lens.
- D. Tube Background: Satin-faced, nonreflective aluminum with permanently etched scale markings.
- E. Window: Glass.
- F. Connector: Adjustable type, 180 degrees in vertical plane, 360 degrees in horizontal plane, with locking device.
- G. Stem: Copper-plated steel, aluminum, or brass for thermowell installation and of length to suit installation.
- H. Accuracy: Plus or minus 1 percent of range or plus or minus 1 scale division to maximum of 1.5 percent of range.

2.2 DUCT-TYPE, LIQUID-IN-GLASS THERMOMETERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Miljoco Corp.
 - 2. Palmer - Wahl Instruments Inc.
 - 3. Trerice, H. O. Co.
 - 4. Weiss Instruments, Inc.
- B. Case: Die-cast aluminum, 7 inches (178 mm) long.
- C. Tube: Red or blue reading, mercury or organic filled, with magnifying lens.
- D. Tube Background: Satin-faced, nonreflective aluminum with permanently etched scale markings.
- E. Window: Glass.

- F. Connector: Adjustable type, 180 degrees in vertical plane, 360 degrees in horizontal plane, with locking device.
- G. Stem: Metal, for installation in mounting bracket and of length to suit installation.
- H. Mounting Bracket: Flanged fitting for attachment to duct and made to hold thermometer stem.
- I. Accuracy: Plus or minus 1 percent of range or plus or minus 1 scale division to maximum of 1.5 percent of range.

2.3 DIRECT-MOUNTING, VAPOR-ACTUATED DIAL THERMOMETERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Ashcroft Commercial Instrument Operations; Dresser Industries; Instrument Div.
 - 2. Marsh Bellofram.
 - 3. Trerice, H. O. Co.
 - 4. Weiss Instruments, Inc.
 - 5. Weksler Instruments Operating Unit; Dresser Industries; Instrument Div.
- B. Case: Liquid-filled type, drawn steel or cast aluminum, 4-1/2-inch (114-mm) diameter.
- C. Element: Bourdon tube or other type of pressure element.
- D. Movement: Mechanical, connecting element and pointer.
- E. Dial: Satin-faced, nonreflective aluminum with permanently etched scale markings.
- F. Pointer: Red metal.
- G. Window: Glass.
- H. Ring: Brass.
- I. Connector: Adjustable type, 180 degrees in vertical plane, 360 degrees in horizontal plane, with locking device.
- J. Thermal System: Liquid- or mercury-filled bulb in copper-plated steel, aluminum, or brass stem for thermowell installation and of length to suit installation.
- K. Accuracy: Plus or minus 1 percent of range or plus or minus 1 scale division to maximum of 1.5 percent of range.

2.4 BIMETALLIC-ACTUATED DIAL THERMOMETERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. Ashcroft Commercial Instrument Operations; Dresser Industries; Instrument Div.
 2. Ernst Gage Co.
 3. Marsh Bellofram.
 4. Miljoco Corp.
 5. Palmer - Wahl Instruments Inc.
 6. REO TEMP Instrument Corporation.
 7. Tel-Tru Manufacturing Company.
 8. Trerice, H. O. Co.
 9. Weiss Instruments, Inc.
 10. Weksler Instruments Operating Unit; Dresser Industries; Instrument Div.
- B. Description: Direct-mounting, bimetallic-actuated dial thermometers complying with ASME B40.3.
- C. Case: Liquid-filled type, stainless steel with 5-inch (127-mm) diameter.
- D. Element: Bimetal coil.
- E. Dial: Satin-faced, nonreflective aluminum with permanently etched scale markings.
- F. Pointer: Red metal.
- G. Window: Glass.
- H. Ring: Stainless steel.
- I. Connector: Adjustable angle type.
- J. Stem: Metal, for thermowell installation and of length to suit installation.
- K. Accuracy: Plus or minus 1 percent of range or plus or minus 1 scale division to maximum of 1.5 percent of range.

2.5 THERMOWELLS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
1. Ashcroft Commercial Instrument Operations; Dresser Industries; Instrument Div.
 2. Ernst Gage Co.
 3. Marsh Bellofram.
 4. Miljoco Corp.
 5. Palmer - Wahl Instruments Inc.
 6. REO TEMP Instrument Corporation.
 7. Tel-Tru Manufacturing Company.
 8. Trerice, H. O. Co.
 9. Weiss Instruments, Inc.
 10. Weksler Instruments Operating Unit; Dresser Industries; Instrument Div.
- B. Manufacturers: Same as manufacturer of thermometer being used.

- C. Description: Pressure-tight, socket-type metal fitting made for insertion into piping and of type, diameter, and length required to hold thermometer.

2.6 PRESSURE GAGES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
1. Ashcroft Commercial Instrument Operations; Dresser Industries; Instrument Div.
 2. Ernst Gage Co.
 3. Marsh Bellofram.
 4. Miljoco Corp.
 5. Palmer - Wahl Instruments Inc.
 6. REO TEMP Instrument Corporation.
 7. Trerice, H. O. Co.
 8. Weiss Instruments, Inc.
 9. Weksler Instruments Operating Unit; Dresser Industries; Instrument Div.
- B. Direct-Mounting, Dial-Type Pressure Gages: Indicating-dial type complying with ASME B40.100.
1. Case: Dry type, drawn steel or cast aluminum, [4-1/2-inch (114-mm) diameter.
 2. Pressure-Element Assembly: Bourdon tube, unless otherwise indicated.
 3. Pressure Connection: Brass, NPS 1/4 (DN 8), bottom-outlet type unless back-outlet type is indicated.
 4. Movement: Mechanical, with link to pressure element and connection to pointer.
 5. Dial: Satin-faced, nonreflective aluminum with permanently etched scale markings.
 6. Pointer: Red metal.
 7. Window: Glass.
 8. Ring: Brass.
 9. Accuracy: Grade A, plus or minus 1 percent of middle half scale.
 10. Vacuum-Pressure Range: 30-in. Hg of vacuum to 15 psig of pressure (100 kPa of vacuum to 103 kPa of pressure).
 11. Range for Fluids under Pressure: Two times operating pressure.
- C. Pressure-Gage Fittings:
1. Valves: NPS 1/4 (DN 8) brass or stainless-steel needle type.
 2. Syphons: NPS 1/4 (DN 8) coil of brass tubing with threaded ends.
 3. Snubbers: ASME B40.5, NPS 1/4 (DN 8) brass bushing with corrosion-resistant, porous-metal disc of material suitable for system fluid and working pressure.

2.7 TEST PLUGS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
1. Flow Design, Inc.
 2. MG Piping Products Co.

3. National Meter, Inc.
 4. Peterson Equipment Co., Inc.
 5. Sisco Manufacturing Co.
 6. Terrice, H. O. Co.
 7. Watts Industries, Inc.; Water Products Div.
- B. Description: Corrosion-resistant brass or stainless-steel body with core inserts and gasketed and threaded cap, with extended stem for units to be installed in insulated piping.
- C. Minimum Pressure and Temperature Rating: 500 psig at 200 deg F (3450 kPa at 93 deg C).
- D. Core Inserts: One or two self-sealing rubber valves.
1. Insert material for air, water, oil, or gas service at 20 to 200 deg F (minus 7 to plus 93 deg C) shall be CR.
 2. Insert material for air or water service at minus 30 to plus 275 deg F (minus 35 to plus 136 deg C) shall be EPDM.
- E. Test Kit: Furnish one test kit(s) containing one pressure gage and adaptor, one thermometer(s), and carrying case. Pressure gage, adapter probes, and thermometer sensing elements shall be of diameter to fit test plugs and of length to project into piping.
1. Pressure Gage: Small bourdon-tube insertion type with 2- to 3-inch- (51- to 76-mm-) diameter dial and probe. Dial range shall be 0 to 200 psig (0 to 1380 kPa).
 2. Low-Range Thermometer: Small bimetallic insertion type with 1- to 2-inch- (25- to 51-mm-) diameter dial and tapered-end sensing element. Dial ranges shall be 25 to 125 deg F (minus 4 to plus 52 deg C).
 3. High-Range Thermometer: Small bimetallic insertion type with 1- to 2-inch- (25- to 51-mm-) diameter dial and tapered-end sensing element. Dial ranges shall be 0 to 220 deg F (minus 18 to plus 104 deg C).
 4. Carrying case shall have formed instrument padding.

2.8 FLOW INDICATORS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
1. Brooks Instrument Div.; Emerson Electric Co.
 2. Dwyer Instruments, Inc.
 3. Ernst Gage Co.
 4. McCrometer, Inc.
 5. OPW Commissioned Systems; Dover Corp.
 6. Penberthy, Inc.
- B. Description: Instrument for installation in piping systems for visual verification of flow.
- C. Construction: Bronze or stainless-steel body; with sight glass and plastic pelton-wheel indicator, and threaded or flanged ends.

- D. Pressure Rating: 125 psig (860 kPa).
- E. Temperature Rating: 200 deg F (93 deg C).
- F. All End Connections: Flanged.

PART 3 - EXECUTION

3.1 THERMOMETER APPLICATIONS

- A. Install liquid-in-glass thermometers in the following locations:
 - 1. Inlet and outlet of each hydronic zone.
 - 2. Inlet and outlet of each hydronic boiler.
 - 3. Inlet and outlet of each hydronic coil.
 - 4. Outside-air, return-air, and mixed-air ducts.
- B. Install direct-mounting, vapor-actuated dial thermometers in the following locations:
 - 1. Inlet and outlet of each hydronic zone.
 - 2. Inlet and outlet of each hydronic boiler.
 - 3. Inlet and outlet of each hydronic coil.
- C. Install bimetallic-actuated dial thermometers in the following locations:
 - 1. Inlet and outlet of each hydronic zone.
 - 2. Inlet and outlet of each hydronic boiler.
 - 3. Inlet and outlet of each hydronic coil.
- D. Install liquid-filled-case-type, bimetallic-actuated dial thermometers at suction and discharge of each pump.
- E. Provide the following temperature ranges for thermometers:
 - 1. Heating Hot Water: 30 to 240 deg F, with 2-degree scale divisions (Minus 1 to plus 115 deg C, with 1-degree scale divisions).
 - 2. Radiator Coolant: 50 to 400 deg F, with 5-degree scale divisions (10 to 205 deg C, with 3-degree scale divisions).
 - 3. Air Ducts: 30 to 240 deg F, with 2-degree scale divisions (Minus 1 to plus 115 deg C, with 1-degree scale divisions).

3.2 GAGE APPLICATIONS

- A. Install liquid-filled-case-type pressure gages at inlets and outlets of boilers and coil.
- B. Install liquid-filled-case-type pressure gages at suction and discharge of each pump.

3.3 INSTALLATIONS

- A. Install direct-mounting thermometers and adjust vertical and tilted positions.
- B. Install thermowells with socket extending to center of pipe and in vertical position in piping tees where thermometers are indicated.
- C. Duct Thermometer Support Flanges: Install in wall of duct where duct thermometers are indicated. Attach to duct with screws.
- D. Install direct-mounting pressure gages in piping tees with pressure gage located on pipe at most readable position.
- E. Install needle-valve and snubber fitting in piping for each pressure gage for fluids.
- F. Install test plugs in tees in piping.
- G. Install flow indicators, in accessible positions for easy viewing, in piping systems.
- H. Install permanent indicators on walls or brackets in accessible and readable positions.
- I. Install connection fittings for attachment to portable indicators in accessible locations.

3.4 CONNECTIONS

- A. Install gages adjacent to machines and equipment to allow service and maintenance for gages, machines, and equipment.

3.5 ADJUSTING

- A. Adjust faces of gages to proper angle for best visibility.

END OF SECTION 23 05 19

SECTION 230523

GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes the following general-duty valves:
 - 1. Copper-alloy ball valves.
 - 2. High-pressure butterfly valves.
 - 3. Bronze check valves.
 - 4. Spring-loaded, lift-disc check valves.
 - 5. Chainwheel actuators.
- B. Related Sections include the following:
 - 1. fire-suppression piping and fire pump Sections for fire-protection valves.
 - 2. Section "Identification for HVAC Piping and Equipment" for valve tags and charts.
 - 3. Section "HVAC Instrumentation and Controls" for control valves and actuators.

1.3 DEFINITIONS

- A. The following are standard abbreviations for valves:
 - 1. CWP: Cold working pressure.
 - 2. EPDM: Ethylene-propylene-diene terpolymer rubber.
 - 3. PTFE: Polytetrafluoroethylene plastic.
 - 4. SWP: Steam working pressure.
 - 5. TFE: Tetrafluoroethylene plastic.

1.4 SUBMITTALS

- A. Product Data: For each type of valve indicated. Include body, seating, and trim materials; valve design; pressure and temperature classifications; end connections; arrangement; dimensions; and required clearances. Include list indicating valve and its application. Include

rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.

1.5 QUALITY ASSURANCE

- A. ASME Compliance: ASME B31.1 for power piping valves and ASME B31.9 for building services piping valves.
- B. NSF Compliance: NSF 61 for valve materials for potable-water service.

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 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.
- 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 handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified, or approved equal.

2.2 VALVES, GENERAL

- A. Refer to Part 3 "Valve Applications" Article for applications of valves.
- B. Bronze Valves: NPS 2 (DN 50) and smaller with threaded ends, unless otherwise indicated.

- C. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
- D. Valve Sizes: Same as upstream pipe, unless otherwise indicated.
- E. Valve Actuators:
 - 1. Chainwheel: For attachment to valves, of size and mounting height, as indicated in the "Valve Installation" Article in Part 3.
 - 2. Handwheel: For valves other than quarter-turn types.
 - 3. Lever Handle: For quarter-turn valves NPS 6 (DN 150) and smaller.
- F. Extended Valve Stems: On insulated valves.
- G. Valve Bypass and Drain Connections: MSS SP-45.

2.3 COPPER-ALLOY BALL VALVES

- A. Manufacturers:
 - 1. One-Piece, Copper-Alloy Ball Valves:
 - a. American Valve, Inc.
 - b. Conbraco Industries, Inc.; Apollo Div.
 - c. Crane Co.; Crane Valve Group; Jenkins Valves.
 - d. Crane Co.; Crane Valve Group; Stockham Div.
 - e. DynaQuip Controls.
 - f. Grinnell Corporation.
 - g. Jamesbury, Inc.
 - h. Kitz Corporation of America.
 - i. Legend Valve & Fitting, Inc.
 - j. NIBCO INC.
 - k. Watts Industries, Inc.; Water Products Div.
 - 2. Two-Piece, Copper-Alloy Ball Valves:
 - a. Conbraco Industries, Inc.; Apollo Div.
 - b. Crane Co.; Crane Valve Group; Crane Valves.
 - c. Crane Co.; Crane Valve Group; Jenkins Valves.
 - d. Crane Co.; Crane Valve Group; Stockham Div.
 - e. DynaQuip Controls.
 - f. Flow-Tek, Inc.
 - g. Grinnell Corporation.
 - h. Hammond Valve.
 - i. Honeywell Braukmann.
 - j. Jamesbury, Inc.
 - k. Jomar International, LTD.

- l. Kitz Corporation of America.
- m. Legend Valve & Fitting, Inc.
- n. Milwaukee Valve Company.
- o. Nexus Valve Specialties.
- p. NIBCO INC.
- q. R & M Energy Systems (Borger, TX).
- r. Red-White Valve Corp.
- s. Richards Industries; Marwin Ball Valves.
- t. Watts Industries, Inc.; Water Products Div.

3. Safety-Exhaust, Copper-Alloy Ball Valves:

- a. Conbraco Industries, Inc.; Apollo Div.
- b. DynaQuip Controls.
- c. Grinnell Corporation.
- d. Hammond Valve.
- e. Jamesbury, Inc.
- f. Milwaukee Valve Company.
- g. NIBCO INC.

B. Copper-Alloy Ball Valves, General: MSS SP-110.

C. One-Piece, Copper-Alloy Ball Valves: Brass or bronze body with chrome-plated bronze ball, PTFE or TFE seats, and 400-psig (2760-kPa) minimum CWP rating.

D. Two-Piece, Copper-Alloy Ball Valves: Bronze body with full-port, chrome-plated bronze ball; PTFE or TFE seats; and 600-psig (4140-kPa) minimum CWP rating and blowout-proof stem.

E. Safety-Exhaust, Copper-Alloy Ball Valves: Two-piece bronze body with exhaust vent opening, chrome-plated ball with vent, blowout-proof stem, locking handle, and working pressure rating of 400-psig (2760-kPa) CWP.

2.4 HIGH-PRESSURE BUTTERFLY VALVES

A. Manufacturers:

- 1. Bray International, Inc.
- 2. Cooper Cameron Corp.; Cooper Cameron Valves Div.
- 3. Crane Co.; Crane Valve Group; Flowseal.
- 4. General Signal; DeZurik Unit.
- 5. Grinnell Corporation.
- 6. Jamesbury, Inc.
- 7. Pratt, Henry Company.
- 8. Process Development & Control.
- 9. Tyco International, Ltd.; Tyco Valves & Controls.
- 10. Xomox Corporation.

- B. High-Pressure Butterfly Valves, General: MSS SP-68.
- C. Single-Flange, Class 150, High-Pressure Butterfly Valves: Wafer type.
- D. Single-Flange, Class 300, High-Pressure Butterfly Valves: Wafer type.

2.5 BRONZE CHECK VALVES

A. Manufacturers:

1. Type 2, Bronze, Horizontal Lift Check Valves with Nonmetallic Disc:

- a. Cincinnati Valve Co.
- b. Crane Co.; Crane Valve Group; Crane Valves.
- c. Crane Co.; Crane Valve Group; Jenkins Valves.
- d. Crane Co.; Crane Valve Group; Stockham Div.
- e. Walworth Co.

2. Type 2, Bronze, Vertical Lift Check Valves with Nonmetallic Disc:

- a. Grinnell Corporation.
- b. Kitz Corporation of America.
- c. Milwaukee Valve Company.

- B. Bronze Check Valves, General: MSS SP-80.
- C. Type 2, Class 150, Bronze, Horizontal Lift Check Valves: Bronze body with nonmetallic disc and bronze seat.
- D. Type 2, Class 150, Bronze, Vertical Lift Check Valves: Bronze body with nonmetallic disc and bronze seat.

2.6 SPRING-LOADED, LIFT-DISC CHECK VALVES

A. Manufacturers:

1. Type II, Compact-Wafer, Lift-Disc Check Valves:

- a. Durabla Fluid Technology, Inc.
- b. Flomatic Valves.
- c. GA Industries, Inc.
- d. Grinnell Corporation.
- e. Hammond Valve.
- f. Metraflex Co.
- g. Milwaukee Valve Company.
- h. Mueller Steam Specialty.

- i. Multiplex Manufacturing Co.
 - j. NIBCO INC.
 - k. SSI Equipment, Inc.
 - l. Val-Matic Valve & Mfg. Corp.
 - m. Valve and Primer Corp.
2. Type IV, Threaded Lift-Disc Check Valves:
- a. Check-All Valve Mfg. Co.
 - b. Durabla Fluid Technology, Inc.
 - c. Grinnell Corporation.
 - d. Legend Valve & Fitting, Inc.
 - e. Metraflex Co.
 - f. Milwaukee Valve Company.
 - g. Mueller Steam Specialty.
 - h. NIBCO INC.
 - i. Watts Industries, Inc.; Water Products Div.
- B. Lift-Disc Check Valves, General: FCI 74-1, with spring-loaded bronze or alloy disc and bronze or alloy seat.
- C. Type II and IV, Class 150, Threaded Lift-Disc Check Valves: Threaded style with bronze shell and threaded ends.

2.7 CHAINWHEEL ACTUATORS

- A. Description: Valve actuation assembly with sprocket rim, brackets, and chain.
- 1. Sprocket Rim with Chain Guides: Bronze, of type and size required for valve.
 - 2. Brackets: Type, number, size, and fasteners required to mount actuator on valve.
 - 3. Chain: Brass, of size required to fit sprocket rim.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine piping system for compliance with requirements for installation tolerances and other conditions affecting performance.
- 1. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. 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.

- C. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.
- D. Examine threads on valve and mating pipe for form and cleanliness.
- E. 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.
- F. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE APPLICATIONS

- A. Refer to piping Sections for specific valve applications. If valve applications are not indicated, use the following:
 - 1. Shutoff Service: Ball, butterfly valves.
 - 2. Throttling Service: ball, butterfly valves.
 - 3. Pump Discharge: Spring-loaded, lift-disc check valves.
- B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP class or CWP ratings may be substituted.
- C. Radiator Coolant Piping: Use the following types of valves:
 - 1. High-Pressure Butterfly Valves, NPS 2 (DN 50) and Larger: Single-flange, Class 300.
- D. Heating Water Piping: Use the following types of valves:
 - 1. Ball Valves, NPS 2 (DN 50) and Smaller: Two-piece, 400-psig (2760-kPa) CWP rating, copper alloy.
 - 2. High-Pressure Butterfly Valves, NPS 2 (DN 50) and Larger: Single-flange, Class 150.
 - 3. Spring-Loaded, Lift-Disc Check Valves, NPS 2 (DN 50) and Smaller: Type IV, Class 150.
 - 4. Spring-Loaded, Lift-Disc Check Valves, NPS 2-1/2 (DN 65) and Larger: Type II, Class 125.
- E. Select valves with the following end connections:
 - 1. For Copper Tubing, NPS 2 (DN 50) and Smaller: Brazed-joint.
 - 2. For Copper Tubing, NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Flanged [or threaded] ends.
 - 3. For Copper Tubing, NPS 5 (DN 125) and Larger: Flanged ends.

3.3 VALVE INSTALLATION

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

- B. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
- C. Locate valves for easy access and provide separate support where necessary.
- D. Install valves in horizontal piping with stem at or above center of pipe.
- E. Install valves in position to allow full stem movement.
- F. Install chainwheel operators on valves NPS 3 (DN 75) and larger and more than 96 inches (2400 mm) above floor. Extend chains to 60 inches (1520 mm) above finished floor elevation.
- G. Install check valves for proper direction of flow and as follows:
 - 1. Dual-Plate Check Valves: In horizontal or vertical position, between flanges.
 - 2. Lift Check Valves: With stem upright and plumb.

3.4 JOINT CONSTRUCTION

- A. Refer to Section "Common Work Results for HVAC" for basic piping joint construction.
- B. Braze Joints: Comply with ASTM standards, unless otherwise indicated.

3.5 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.

END OF SECTION 23 05 23

SECTION 230529

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes the following hangers and supports for HVAC system piping and equipment:
 - 1. Steel pipe hangers and supports.
 - 2. Trapeze pipe hangers.
 - 3. Metal framing systems.
 - 4. Thermal-hanger shield inserts.
 - 5. Fastener systems.
 - 6. Pipe stands.
 - 7. Equipment supports.
- B. Related Sections include the following:
 - 1. Section "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
 - 2. Section "Fire-Suppression Piping" for pipe hangers for fire-protection piping.
 - 3. Section "Vibration and Seismic Controls for HVAC Piping and Equipment" for vibration isolation devices.
 - 4. Section "Expansion Fittings and Loops for HVAC Piping" for pipe guides and anchors.
 - 5. Section(s) "Metal Ducts" for duct hangers and supports.

1.3 DEFINITIONS

- A. MSS: Manufacturers Standardization Society for The Valve and Fittings Industry Inc.
- B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.4 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
- C. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.5 SUBMITTALS

- A. Product Data: For the following:
 - 1. Steel pipe hangers and supports.
 - 2. Thermal-hanger shield inserts.
- B. Shop Drawings: Show fabrication and installation details and include calculations for the following:
 - 1. Trapeze pipe hangers. Include Product Data for components.
 - 2. Metal framing systems. Include Product Data for components.
 - 3. Pipe stands. Include Product Data for components.
 - 4. Equipment supports.
- C. Welding certificates.

1.6 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code--Steel."
 - 2. AWS D1.2, "Structural Welding Code--Aluminum."
 - 3. AWS D1.3, "Structural Welding Code--Sheet Steel."
 - 4. AWS D1.4, "Structural Welding Code--Reinforcing Steel."
 - 5. ASME Boiler and Pressure Vessel Code: Section IX.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified, or approved equal.

2.2 STEEL PIPE HANGERS AND SUPPORTS

- A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.
- B. Manufacturers:
 - 1. AAA Technology & Specialties Co., Inc.
 - 2. Bergen-Power Pipe Supports.
 - 3. B-Line Systems, Inc.; a division of Cooper Industries.
 - 4. Carpenter & Paterson, Inc.
 - 5. Empire Industries, Inc.
 - 6. ERICO/Michigan Hanger Co.
 - 7. Globe Pipe Hanger Products, Inc.
 - 8. Grinnell Corp.
 - 9. GS Metals Corp.
 - 10. National Pipe Hanger Corporation.
 - 11. PHD Manufacturing, Inc.
 - 12. PHS Industries, Inc.
 - 13. Piping Technology & Products, Inc.
 - 14. Tolco Inc.
- C. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.
- D. Nonmetallic Coatings: Plastic coating, jacket, or liner.
- E. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.3 TRAPEZE PIPE HANGERS

- A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

2.4 METAL FRAMING SYSTEMS

- A. Description: MFMA-3, shop- or field-fabricated pipe-support assembly made of steel channels and other components.
- B. Manufacturers:
 - 1. B-Line Systems, Inc.; a division of Cooper Industries.
 - 2. ERICO/Michigan Hanger Co.; ERISTRUT Div.
 - 3. GS Metals Corp.
 - 4. Power-Strut Div.; Tyco International, Ltd.
 - 5. Thomas & Betts Corporation.
 - 6. Tolco Inc.
 - 7. Unistrut Corp.; Tyco International, Ltd.

- C. Coatings: Manufacturer's standard finish, unless bare metal surfaces are indicated.
- D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

2.5 THERMAL-HANGER SHIELD INSERTS

- A. Description: 100-psig- (690-kPa-) minimum, compressive-strength insulation insert encased in sheet metal shield.
- B. Manufacturers:
 - 1. Carpenter & Paterson, Inc.
 - 2. ERICO/Michigan Hanger Co.
 - 3. PHS Industries, Inc.
 - 4. Pipe Shields, Inc.
 - 5. Rilco Manufacturing Company, Inc.
 - 6. Value Commissioned Products, Inc.
- C. Insulation-Insert Material for Cold Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with vapor barrier.
- D. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate.
- E. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
- F. For Clevis Hangers: Insert and shield shall cover lower 180 degrees of pipe.
- G. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

2.6 FASTENER SYSTEMS

- A. Mechanical-Expansion Anchors: Insert-wedge-type zinc-coated steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
 - 1. Manufacturers:
 - a. B-Line Systems, Inc.; a division of Cooper Industries.
 - b. Empire Industries, Inc.
 - c. Hilti, Inc.
 - d. ITW Ramset/Red Head.
 - e. MKT Fastening, LLC.
 - f. Powers Fasteners.

2.7 PIPE STAND FABRICATION

- A. Pipe Stands, General: Shop or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.
- B. Compact Pipe Stand: One-piece plastic unit with integral-rod-roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.
 - 1. Manufacturers:
 - a. ERICO/Michigan Hanger Co.
 - b. MIRO Industries.
 - c. Portable Pipe Hangers.
- C. High-Type, Single-Pipe Stand: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
 - 1. Manufacturers:
 - a. ERICO/Michigan Hanger Co.
 - b. MIRO Industries.
 - c. Portable Pipe Hangers.
 - 2. Base: steel.
 - 3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
 - 4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.
- D. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe support made from structural-steel shape, continuous-thread rods, and rollers for mounting on permanent stationary roof curb.

2.8 EQUIPMENT SUPPORTS

- A. Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.

2.9 MISCELLANEOUS MATERIALS

- A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
- B. Grout: ASTM C 1107, 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 (34.5-MPa), 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

- A. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.
- B. Comply with MSS SP-69 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 padded hangers for piping that is subject to scratching.
- F. 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 stationary pipes, NPS 1/2 to NPS 30 (DN 15 to DN 750).
 - 2. Single Pipe Rolls (MSS Type 41): For suspension of pipes, NPS 1 to NPS 30 (DN 25 to DN 750), from 2 rods if longitudinal movement caused by expansion and contraction might occur.
- G. 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 20 (DN 20 to DN 500).
- H. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - 1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches (150 mm) for heavy loads.
 - 2. Steel Clevises (MSS Type 14): For 120 to 450 deg F (49 to 232 deg C) piping installations.
- I. Building Attachments: 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. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 - 3. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.

4. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:
 - a. Light (MSS Type 31): 750 lb (340 kg).
 - b. Medium (MSS Type 32): 1500 lb (680 kg).
 - c. Heavy (MSS Type 33): 3000 lb (1360 kg).
 5. Side-Beam Brackets (MSS Type 34): For sides of wooden beams.
 6. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.
- J. Saddles and Shields: 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.
 3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
- K. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
 2. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41 roll hanger with springs.
 3. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
 4. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from hanger.
 5. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to absorb expansion and contraction of piping system from trapeze support.
- L. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.
- M. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.
- N. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.

3.2 HANGER AND SUPPORT INSTALLATION

- A. Steel Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

- B. Trapeze Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. 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 above for individual pipe hangers.
 2. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.
- C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.
- D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
- E. Fastener System Installation:
1. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
- F. Pipe Stand Installation:
1. Pipe Stand: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
 2. Curb-Mounting-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb.
- G. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.
- H. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
- I. 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.
- J. Install lateral bracing with pipe hangers and supports to prevent swaying.
- K. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 1-1/2 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.
- L. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
- M. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 (for power piping) and ASME B31.9 (for building services piping) are not exceeded.
- N. Insulated Piping: Comply with the following:

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 according to ASME B31.1 for power piping and 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.
3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
4. Shield Dimensions for Pipe: Not less than the following:
 - a. NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90): 12 inches (305 mm) long and 0.048 inch (1.22 mm) thick.
 - b. NPS 4 (DN 100): 12 inches (305 mm) long and 0.06 inch (1.52 mm) thick.
 - c. NPS 5 and NPS 6 (DN 125 and DN 150): 18 inches (457 mm) long and 0.06 inch (1.52 mm) thick.
5. Insert Material: Length at least as long as protective shield.
6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.3 EQUIPMENT SUPPORTS

- A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
- B. Grouting: Place grout under supports for equipment and make smooth bearing surface.
- C. Provide lateral bracing, to prevent swaying, for equipment supports.

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 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 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 (40 mm).

3.6 PAINTING

- A. Touch Up: 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.
 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils (0.05 mm).
- B. Touch Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in painting Sections.
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 23 05 29

SECTION 230548

VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Isolation pads.
 - 2. Restrained elastomeric isolation mounts.
 - 3. Restrained spring isolators.
 - 4. Spring hangers with vertical-limit stops.
 - 5. Pipe riser resilient supports.
 - 6. Resilient pipe guides.
 - 7. Restrained vibration isolation roof-curb rails.
 - 8. Seismic snubbers.
 - 9. Restraining braces and cables.
 - 10. Steel vibration isolation equipment bases.

1.3 DEFINITIONS

- A. IBC: International Building Code.
- B. ICC-ES: ICC-Evaluation Service.
- C. OSHPD: Office of Statewide Health Planning and Development for the State of California.

1.4 PERFORMANCE REQUIREMENTS

- A. Wind-Restraint Loading:
 - 1. Basic Wind Speed: 15 mph.

2. Minimum 10 lb/sq. ft. (48.8 kg/sq. m) multiplied by the maximum area of the HVAC component projected on a vertical plane that is normal to the wind direction, and 45 degrees either side of normal.

B. Seismic-Restraint Loading:

1. Site Class as Defined in the IBC.
2. Assigned Seismic Use Group or Building Category as Defined in the IBC.

1.5 SUBMITTALS

A. Product Data: For the following:

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 seismic-restraint component used.
 - a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an agency acceptable to authorities having jurisdiction.
 - b. Annotate to indicate application of each product submitted and compliance with requirements.
3. Interlocking Snubbers: Include ratings for horizontal, vertical, and combined loads.

B. Delegated-Design Submittal: For vibration isolation and seismic-restraint details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional Commissioner licensed in the State of New York responsible for their preparation.

1. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, seismic and wind forces required to select vibration isolators, seismic and wind restraints, and for designing vibration isolation bases.
 - a. Coordinate design calculations with wind load calculations required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.
2. Riser Supports: Include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on building structure, spring deflection changes, and seismic loads. Include certification that riser system has been examined for excessive stress and that none will exist.
3. Vibration Isolation Base Details: Detail overall dimensions, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and

rails, base weights, equipment static loads, power transmission, component misalignment, and cantilever loads.

4. Seismic and Wind-Restraint Details:

- a. Design Analysis: To support selection and arrangement of seismic and wind restraints. Include calculations of combined tensile and shear loads.
 - b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the 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 and vibration isolation details with wind-restraint details required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.
 - d. Preapproval and Evaluation Documentation: By an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).
- C. Coordination Drawings: Show coordination of seismic bracing for HVAC piping and equipment with other systems and equipment in the vicinity, including other supports and seismic restraints.
- D. Welding certificates.
- E. Qualification Data: For professional Commissioner licensed in the State of New York and testing agency.
- F. Field quality-control test reports.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
- B. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
- C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- D. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing

are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional Commissioner licensed in the State of New York.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - 1. Ace Mountings Co., Inc.
 - 2. Amber/Booth Company, Inc.
 - 3. California Dynamics Corporation.
 - 4. Isolation Technology, Inc.
 - 5. Kinetics Noise Control.
 - 6. Mason Industries.
 - 7. Vibration Eliminator Co., Inc.
 - 8. Vibration Isolation.
 - 9. Vibration Mountings & Controls, Inc.
- B. Pads: Arranged in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.
 - 1. Resilient Material: Oil- and water-resistant neoprene.
- C. Restrained Mounts: All-directional mountings with seismic restraint.
 - 1. Materials: Cast-ductile-iron or welded steel housing containing two separate and opposing, oil-resistant rubber or neoprene elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
 - 2. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.
- D. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic or limit-stop restraint.
 - 1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to weight being removed; factory-drilled baseplate bonded to 1/4-inch- (6-mm-) thick, neoprene or rubber isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
 - 2. Restraint: Seismic or limit stop as required for equipment and authorities having jurisdiction.

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.
- E. Spring Hangers with Vertical-Limit Stop: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression and with a vertical-limit stop.
1. 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.
 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. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
 7. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
 8. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.
- F. Pipe Riser Resilient Support: All-directional, acoustical pipe anchor consisting of 2 steel tubes separated by a minimum of 1/2-inch- (13-mm-) thick neoprene. Include steel and neoprene vertical-limit stops arranged to prevent vertical travel in both directions. Design support for a maximum load on the isolation material of 500 psig (3.45 MPa) and for equal resistance in all directions.
- G. Resilient Pipe Guides: Telescopic arrangement of 2 steel tubes or post and sleeve arrangement separated by a minimum of 1/2-inch- (13-mm-) thick neoprene. Where clearances are not readily visible, a factory-set guide height with a shear pin to allow vertical motion due to pipe expansion and contraction shall be fitted. Shear pin shall be removable and reinsertable to allow for selection of pipe movement. Guides shall be capable of motion to meet location requirements.

2.2 RESTRAINED VIBRATION ISOLATION ROOF-CURB RAILS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
1. Amber/Booth Company, Inc.
 2. California Dynamics Corporation.
 3. Isolation Technology, Inc.

Bronx River Art Center
Bronx, NY

Vibration and Seismic Controls For
HVAC piping And Equipment
230548 Page 5 of 12

4. Kinetics Noise Control.
 5. Mason Industries.
 6. Thybar Corporation.
 7. Vibration Eliminator Co., Inc.
 8. Vibration Isolation.
 9. Vibration Mountings & Controls, Inc.
- B. General Requirements for Restrained Vibration Isolation Roof-Curb Rails: Factory-assembled, fully enclosed, insulated, air- and watertight curb rail designed to resiliently support equipment and to withstand seismic and wind forces.
- C. Lower Support Assembly: Formed sheet-metal section containing adjustable and removable steel springs that support upper frame. Upper frame shall provide continuous support for equipment and shall be captive to resiliently resist seismic and wind forces. Lower support assembly shall have a means for attaching to building structure and a wood nailer for attaching roof materials, and shall be insulated with a minimum of 2 inches (50 mm) of rigid, glass-fiber insulation on inside of assembly.
- D. Spring Isolators: Adjustable, restrained spring isolators shall be mounted on 1/4-inch- (6-mm-) thick, elastomeric vibration isolation pads and shall have access ports, for level adjustment, with removable waterproof covers at all isolator locations. Isolators shall be located so they are accessible for adjustment at any time during the life of the installation without interfering with the integrity of the roof.
1. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic or wind restraint.
 - a. Housing: Steel with resilient vertical-limit stops and adjustable equipment mounting and leveling bolt.
 - b. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - c. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - d. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - e. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 2. Pads: Arranged in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.
 - a. Resilient Material: Oil- and water-resistant standard neoprene.
- E. Snubber Bushings: All-directional, elastomeric snubber bushings at least 1/4 inch (6 mm) thick.
- F. Water Seal: Galvanized sheet metal with EPDM seals at corners, attached to upper support frame, extending down past wood nailer of lower support assembly, and counterflashed over roof materials.

2.3 VIBRATION ISOLATION EQUIPMENT BASES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
1. Amber/Booth Company, Inc.
 2. California Dynamics Corporation.
 3. Isolation Technology, Inc.
 4. Kinetics Noise Control.
 5. Mason Industries.
 6. Vibration Eliminator Co., Inc.
 7. Vibration Isolation.
 8. Vibration Mountings & Controls, Inc.
- B. Steel Base: Factory-fabricated, welded, structural-steel bases and rails.
1. Design Requirements: Lowest possible mounting height with not less than 1-inch (25-mm) clearance above the floor. Include equipment anchor bolts and auxiliary motor slide bases or rails.
 - a. Include supports for suction and discharge elbows for pumps.
 2. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Bases shall 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.

2.4 SEISMIC-RESTRAINT DEVICES

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
1. Amber/Booth Company, Inc.
 2. California Dynamics Corporation.
 3. Cooper B-Line, Inc.; a division of Cooper Industries.
 4. Hilti, Inc.
 5. Kinetics Noise Control.
 6. Loos & Co.; Cableware Division.
 7. Mason Industries.
 8. TOLCO Incorporated; a brand of NIBCO INC.
 9. Unistrut; Tyco International, Ltd.
- B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an agency acceptable to authorities having jurisdiction.

1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.
- C. Snubbers: Factory fabricated using welded structural-steel shapes and plates, anchor bolts, and replaceable resilient isolation washers and bushings.
1. Anchor bolts for attaching to concrete shall be seismic-rated, drill-in, and stud-wedge or female-wedge type.
 2. Resilient Isolation Washers and Bushings: Oil- and water-resistant neoprene.
 3. Maximum 1/4-inch (6-mm) air gap, and minimum 1/4-inch- (6-mm-) thick resilient cushion.
- D. Restraint Cables: ASTM A 603 galvanized-steel cables with end connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement.
- E. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod.
- F. 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.
- G. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.
- H. Mechanical Anchor Bolts: 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 required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.

2.5 FACTORY FINISHES

- A. Finish: Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.
1. Powder coating on springs and housings.
 2. All hardware shall be galvanized. Hot-dip galvanize metal components for exterior use.
 3. Baked enamel or powder coat for metal components on isolators for interior use.
 4. Color-code or otherwise mark vibration isolation and seismic- and wind-control devices to indicate capacity range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and equipment to receive vibration isolation and seismic- and wind-control devices for compliance with requirements for installation tolerances and other conditions affecting performance.
- 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.

3.2 APPLICATIONS

- A. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.
- B. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.3 VIBRATION-CONTROL AND SEISMIC-RESTRAINT DEVICE INSTALLATION

- A. Comply with requirements in Section "Roof Accessories" for installation of roof curbs, equipment supports, and roof penetrations.
- B. Vibration isolation used for mechanical equipment shall comply with the requirements of the New York City Building Code, and shall be mounted on vibration isolators. All air handlers located above the lowest floor shall be provided with neoprene pads between the bottom rail and the housekeeping pad.
- C. Equipment Restraints:
 - 1. Install seismic snubbers on HVAC 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 (3.2 mm).
 - 3. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.
- D. Piping Restraints:

1. Comply with requirements in MSS SP-127.
 2. Space lateral supports a maximum of 40 feet (12 m) o.c., and longitudinal supports a maximum of 80 feet (24 m) o.c.
 3. Brace a change of direction longer than 12 feet (3.7 m).
- E. Install cables so they do not bend across edges of adjacent equipment or building structure.
- F. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.
- G. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.
- H. 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.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
 2. Schedule test with City of New York, through 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 least 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.
 9. Air-Mounting System Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 10. Air-Mounting System Operational Test: Test the compressed-air leveling system.
 11. Test and adjust air-mounting system controls and safeties.
 12. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.
- D. Remove and replace malfunctioning units and retest as specified above.

- E. Prepare test and inspection reports.

3.5 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

- A. Install flexible connections in piping where they cross seismic joints, 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 "Hydronic Piping" for piping flexible connections. Retain one of first two paragraphs below to identify who shall perform tests and inspections. If retaining second option in first paragraph, or if retaining second paragraph, retain "Field quality-control test reports" Paragraph in "Submittals" Article.

3.6 ADJUSTING

- A. Adjust isolators after piping 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.
- C. Adjust active height of spring isolators.
- D. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION 23 05 48

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 230553

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Equipment labels.
 - 2. Warning signs and labels.
 - 3. Pipe labels.
 - 4. Duct labels.
 - 5. Valve tags.
 - 6. Warning tags.

1.3 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 to include in maintenance manuals.

1.4 COORDINATION

- 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.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

- A. Metal Labels for Equipment:
 - 1. Material and Thickness: Brass, 0.032-inch (0.8-mm) minimum thickness, and having predrilled or stamped holes for attachment hardware.
 - 2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
 - 3. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 - 4. Fasteners: Stainless-steel self-tapping screws.
 - 5. 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), plus the Specification Section number and title where equipment is specified.
- C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch (A4) bond paper enclosed in a metal frame and glass cover. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 WARNING SIGNS AND LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch (3.2 mm) thick, and having predrilled holes for attachment hardware.
- B. Letter Color: Black.
- C. Background Color: Yellow.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
- F. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), 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 self-tapping screws.
- H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
- I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.3 PIPE LABELS

- A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
- B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.
- 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, pipe size, and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
 - 2. Lettering Size: At least 1-1/2 inches (38 mm) high.

2.4 DUCT LABELS

- A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch (3.2 mm) thick, and having predrilled holes for attachment hardware.
- B. Letter Color: Black.
- C. Background Color: White.
- D. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).
- E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
- F. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), 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 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, duct size, and an arrow indicating flow direction.
 - 1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions, or as separate unit on each duct label to indicate flow direction.
 - 2. Lettering Size: At least 1-1/2 inches (38 mm) high.

2.5 VALVE TAGS

- A. Valve Tags: Stamped or engraved with 1/4-inch (6.4-mm) letters for piping system abbreviation and 1/2-inch (13-mm) numbers.
 - 1. Tag Material: Brass, 0.032-inch (0.8-mm) minimum thickness, and having predrilled or stamped holes for attachment hardware.
 - 2. Fasteners: Brass beaded chain.
- B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch (A4) bond paper enclosed in a metal frame and glass cover. 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. Valve-tag schedule shall be included in operation and maintenance data.

2.6 WARNING TAGS

- A. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.
 - 1. Size: Approximately 4 by 7 inches (100 by 178 mm).
 - 2. Fasteners: Brass grommet and wire.
 - 3. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
 - 4. Color: Yellow background with black lettering.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

- A. Install or permanently fasten labels on each major item of mechanical equipment.
- B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

- A. Piping Color-Coding: Painting of piping is specified in general Sections.
- B. 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. Near each valve and control device.
 - 2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 - 3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 - 4. At access doors, manholes, and similar access points that permit view of concealed piping.
 - 5. Near major equipment items and other points of origination and termination.
 - 6. Spaced at maximum intervals of 50 feet (15 m) along each run. Reduce intervals to 25 feet (7.6 m) in areas of congested piping and equipment.
 - 7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
- C. Pipe Label Color Schedule:
 - 1. Heating Water Piping:
 - a. Background Color: White.
 - b. Letter Color: Red.
 - 2. Engine Coolant Piping:
 - a. Background Color: White.
 - b. Letter Color: Orange.
 - 3. Refrigerant Piping:
 - a. Background Color: White.
 - b. Letter Color: Blue.

3.4 DUCT LABEL INSTALLATION

- A. Install self-adhesive duct labels with permanent adhesive on air ducts in the following color codes:

1. Blue: For cold-air supply ducts.
 2. Yellow: For hot-air supply ducts.
 3. Green: For exhaust-, outside-, relief-, return-, and mixed-air ducts.
 4. ASME A13.1 Colors and Designs: For hazardous material exhaust.
- B. Locate labels near points where ducts enter into concealed spaces and at maximum intervals of 30 feet in each space where ducts are exposed or concealed by removable ceiling system.

3.5 VALVE-TAG INSTALLATION

- 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 HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
- B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
1. Valve-Tag Size and Shape:
 - a. Refrigerant: 2 inches (50 mm), round.
 - b. Hot Water: 2 inches (50 mm), round.
 - c. Engine Coolant: 2 inches (50 mm), round.
 - d. Gas: 2 inches (50 mm), round.
 2. Valve-Tag Color:
 - a. Refrigerant: Natural.
 - b. Hot Water: Natural.
 - c. Engine Coolant: Natural.
 - d. Gas: Natural.
 3. Letter Color:
 - a. Refrigerant: Black.
 - b. Hot Water: Black.
 - c. Engine Coolant: Black.
 - d. Gas: Black.

3.6 WARNING-TAG INSTALLATION

- A. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 23 05 53

SECTION 230700
HVAC INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Insulation Materials:
 - a. Flexible elastomeric.
 - b. Mineral fiber.
 - c. Calcium Silicate.
 - 2. Fire-rated insulation systems.
 - 3. Adhesives.
 - 4. Mastics.
 - 5. Lagging adhesives.
 - 6. Sealants.
 - 7. Factory-applied jackets.
 - 8. Field-applied cloths.
 - 9. Field-applied jackets.
 - 10. Securements.
 - 11. Corner angles.
- B. Related Sections:
 - 1. Section "Metal Ducts" for duct liners.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include thermal conductivity, thickness, and jackets (both factory and field applied, if any).
- B. Shop Drawings:
 - 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.
 8. Detail field application for each equipment type.
- C. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use.
1. Sample Sizes:
 - a. Preformed Pipe Insulation Materials: 12 inches long by NPS 2.
 - b. Sheet Form Insulation Materials: 12 inches square.
 - c. Jacket Materials for Pipe: 12 inches long by NPS 2.
 - d. Sheet Jacket Materials: 12 inches square.
 - e. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.
- D. Qualification Data: For qualified Installer.
- E. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction 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.
- F. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, and cement material containers, with appropriate markings of applicable testing and inspecting agency.
1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.6 COORDINATION

- A. Coordinate size and location of supports, hangers, and insulation shields specified in Section "Hangers and Supports."
- B. Coordinate clearance requirements with piping Installer for piping insulation application, duct Installer for duct insulation application, and equipment Installer for equipment insulation application. Before preparing piping and ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.7 SCHEDULING

- A. Schedule insulation application after pressure testing systems. Insulation application may begin on segments that have satisfactory test results.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.

1. Products: Subject to compliance with requirements, provide the following, or approved equal:
 - a. Aeroflex USA Inc.; Aerocel.
 - b. Armacell LLC; AP Armaflex.
 - c. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180.
- G. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type III with factory-applied FSK jacket. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 1. Products: Subject to compliance with requirements, provide the following, or approved equal:
 - a. CertainTeed Corp.; Duct Wrap.
 - b. Johns Manville; Microlite.
 - c. Knauf Insulation; Duct Wrap.
 - d. Manson Insulation Inc.; Alley Wrap.
 - e. Owens Corning; All-Service Duct Wrap.
- H. High-Temperature, Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type V, without factory-applied jacket.
 1. Products: Subject to compliance with requirements, provide the following, or approved equal:
 - a. CertainTeed Corp.; Duct Wrap.
 - b. Johns Manville; Microlite.
 - c. Knauf Insulation; Duct Wrap.
 - d. Manson Insulation Inc.; Alley Wrap.
 - e. Owens Corning; All-Service Duct Wrap.
- I. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation with factory-applied ASJ. For equipment applications, provide insulation with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 1. Products: Subject to compliance with requirements, provide the following, or approved equal:
 - a. CertainTeed Corp.; Commercial Board.
 - b. Fibrex Insulations Inc.; FBX.
 - c. Johns Manville; 800 Series Spin-Glas.
 - d. Knauf Insulation; Insulation Board.
 - e. Manson Insulation Inc.; AK Board.
 - f. Owens Corning; Fiberglas 700 Series.
- J. High-Temperature, Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type III, without factory-applied jacket.

1. Products: Subject to compliance with requirements, provide the following, or approved equal:

- a. Fibrex Insulations Inc.; FBX.
- b. Johns Manville; 1000 Series Spin-Glas.
- c. Owens Corning; High Temperature Industrial Board Insulations.
- d. Rock Wool Manufacturing Company; Delta Board.
- e. Roxul Inc.; Roxul RW.
- f. Thermafiber; Thermafiber Industrial Felt.

K. Mineral-Fiber, Preformed Pipe Insulation:

1. Products: Subject to compliance with requirements, provide the following, or approved equal:

- a. Fibrex Insulations Inc.; Coreplus 1200.
- b. Johns Manville; Micro-Lok.
- c. Knauf Insulation; 1000 Pipe Insulation.
- d. Manson Insulation Inc.; Alley-K.
- e. Owens Corning; Fiberglas Pipe Insulation.

2. Type I, 850 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
3. Type II, 1200 deg F Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type II, Grade A, with factory-applied ASJ-SSL. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

L. Mineral-Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semirigid board material with factory-applied ASJ complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB. Nominal density is 2.5 lb/cu. ft. or more. Thermal conductivity (k-value) at 100 deg F is 0.29 Btu x in./h x sq. ft. x deg F or less. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide the following, or approved equal:

- a. CertainTeed Corp.; CrimpWrap.
- b. Johns Manville; MicroFlex.
- c. Knauf Insulation; Pipe and Tank Insulation.
- d. Manson Insulation Inc.; AK Flex.
- e. Owens Corning; Fiberglas Pipe and Tank Insulation.

2.2 FIRE-RATED INSULATION SYSTEMS

- A. Fire-Rated Blanket: High-temperature, flexible, blanket insulation with FSK jacket that is tested and certified to provide a 2-hour fire rating by a NRTL acceptable to authority having jurisdiction.

1. Products: Subject to compliance with requirements, provide the following, or approved equal:

- a. CertainTeed Corp.; FlameChek.
- b. Johns Manville; Firetemp Wrap.
- c. Nelson Firestop Products; Nelson FSB Flameshield Blanket.
- d. Thermal Ceramics; FireMaster Duct Wrap.
- e. 3M; Fire Barrier Wrap Products.
- f. Unifrax Corporation; FyreWrap.
- g. Vesuvius; PYROSCAT FP FASTR Duct Wrap.

2.3 ADHESIVES

- A. Materials shall be 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 Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. Products: Subject to compliance with requirements, provide the following, or approved equal:

- a. Aeroflex USA Inc.; Aeroseal.
- b. Armacell LCC; 520 Adhesive.
- c. Foster Products Corporation, H. B. Fuller Company; 85-75.
- d. RBX Corporation; Rubatex Contact Adhesive.

- C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, provide the following, or approved equal:

- a. Childers Products, Division of ITW; CP-82.
- b. Foster Products Corporation, H. B. Fuller Company; 85-20.
- c. ITW TACC, Division of Illinois Tool Works; S-90/80.
- d. Marathon Industries, Inc.; 225.
- e. Mon-Eco Industries, Inc.; 22-25.

- D. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products: Subject to compliance with requirements, provide the following, or approved equal:

- a. Childers Products, Division of ITW; CP-82.
- b. Foster Products Corporation, H. B. Fuller Company; 85-20.
- c. ITW TACC, Division of Illinois Tool Works; S-90/80.
- d. Marathon Industries, Inc.; 225.
- e. Mon-Eco Industries, Inc.; 22-25.

E. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements, provide the following, or approved equal:
 - a. Dow Chemical Company (The); 739, Dow Silicone.
 - b. Johns-Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
 - c. P.I.C. Plastics, Inc.; Welding Adhesive.
 - d. Red Devil, Inc.; Celulon Ultra Clear.

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.

B. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.

1. Products: Subject to compliance with requirements, provide the following, or approved equal:
 - a. Childers Products, Division of ITW; CP-35.
 - b. Foster Products Corporation, H. B. Fuller Company; 30-90.
 - c. ITW TACC, Division of Illinois Tool Works; CB-50.
 - d. Marathon Industries, Inc.; 590.
 - e. Mon-Eco Industries, Inc.; 55-40.
 - f. Vimasco Corporation; 749.
2. Water-Vapor Permeance: ASTM E 96, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.
5. Color: White.

C. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.

1. Products: Subject to compliance with requirements, provide the following, or approved equal:
 - a. Childers Products, Division of ITW; CP-10.
 - b. Foster Products Corporation, H. B. Fuller Company; 35-00.
 - c. ITW TACC, Division of Illinois Tool Works; CB-05/15.
 - d. Marathon Industries, Inc.; 550.
 - e. Mon-Eco Industries, Inc.; 55-50.
 - f. Vimasco Corporation; WC-1/WC-5.
2. Water-Vapor Permeance: ASTM F 1249, 3 perms at 0.0625-inch dry film thickness.
3. Service Temperature Range: Minus 20 to plus 200 deg F.
4. Solids Content: 63 percent by volume and 73 percent by weight.

5. Color: White.

2.5 LAGGING ADHESIVES

- A. Description: Comply with MIL-A-3316C Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.
1. Products: Subject to compliance with requirements, provide the following, or approved equal:
 - a. Childers Products, Division of ITW; CP-52.
 - b. Foster Products Corporation, H. B. Fuller Company; 81-42.
 - c. Marathon Industries, Inc.; 130.
 - d. Mon-Eco Industries, Inc.; 11-30.
 - e. Vimasco Corporation; 136.
 2. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over duct, equipment, and pipe insulation.
 3. Service Temperature Range: Minus 50 to plus 180 deg F.
 4. Color: White.

2.6 SEALANTS

A. Joint Sealants:

1. Materials shall be compatible with insulation materials, jackets, and substrates.
2. Permanently flexible, elastomeric sealant.
3. Service Temperature Range: Minus 100 to plus 300 deg F.
4. Color: White or gray.

B. FSK and Metal Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide the following, or approved equal:
 - a. Childers Products, Division of ITW; CP-76-8.
 - b. Foster Products Corporation, H. B. Fuller Company; 95-44.
 - c. Marathon Industries, Inc.; 405.
 - d. Mon-Eco Industries, Inc.; 44-05.
 - e. Vimasco Corporation; 750.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: Aluminum.

C. ASJ Flashing Sealants, PVDC, and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide the following:
 - a. Childers Products, Division of ITW; CP-76. Marathon Industries, Inc.; 405.
 - b. Mon-Eco Industries, Inc.; 44-05.
 - c. Vimasco Corporation; 750.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: White.

2.7 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 C 1136, Type I.
 2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
 3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
 4. FSP Jacket: Aluminum-foil, fiberglass-reinforced scrim with polyethylene backing; complying with ASTM C 1136, Type II.
 5. PVDC Jacket for Indoor Applications: 4-mil- thick, white PVDC biaxially oriented barrier film with a permeance at 0.02 perms when tested according to ASTM E 96 and with a flame-spread index of 5 and a smoke-developed index of 20 when tested according to ASTM E 84.
 6. PVDC Jacket for Outdoor Applications: 6-mil- thick, white PVDC biaxially oriented barrier film with a permeance at 0.01 perms when tested according to ASTM E 96 and with a flame-spread index of 5 and a smoke-developed index of 25 when tested according to ASTM E 84.
 7. PVDC-SSL Jacket: PVDC jacket with a self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip.

2.8 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.
- C. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, 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. Products: Subject to compliance with requirements, provide the following, or approved equal:
 - a. Johns Manville; Zeston.

- b. P.I.C. Plastics, Inc.; FG Series.
 - c. Proto PVC Corporation; LoSmoke.
 - d. Speedline Corporation; SmokeSafe.
- 2. Adhesive: As recommended by jacket material manufacturer.
 - 3. Color: White.
 - 4. 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.
 - 5. Factory-fabricated tank heads and tank side panels.
- D. Metal Jacket:
- 1. Products: Subject to compliance with requirements, provide the following, or approved equal:
 - a. Childers Products, Division of ITW; Metal Jacketing Systems.
 - b. PABCO Metals Corporation; Surefit.
 - c. RPR Products, Inc.; Insul-Mate.
 - 2. Stainless-Steel Jacket: ASTM A 167 or ASTM A 240/A 240M.
 - a. Factory cut and rolled to size.
 - b. Material, finish, and thickness are indicated in field-applied jacket schedules.
 - c. Moisture Barrier for Indoor Applications: 2.5-mil- thick Polysurlyn.
 - d. Moisture Barrier for Outdoor Applications: 2.5-mil- thick Polysurlyn.
 - e. Factory-Fabricated Fitting Covers:
 - 1) Same material, finish, and thickness as jacket.
 - 2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
 - 3) Tee covers.
 - 4) Flange and union covers.
 - 5) End caps.
 - 6) Beveled collars.
 - 7) Valve covers.
 - 8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.
- E. PVDC Jacket for Indoor Applications: 4-mil- thick, white PVDC biaxially oriented barrier film with a permeance at 0.02 perms when tested according to ASTM E 96 and with a flame-spread index of 5 and a smoke-developed index of 20 when tested according to ASTM E 84.
- F. PVDC Jacket for Outdoor Applications: 6-mil- thick, white PVDC biaxially oriented barrier film with a permeance at 0.01 perms when tested according to ASTM E 96 and with a flame-spread index of 5 and a smoke-developed index of 25 when tested according to ASTM E 84.

2.9 SECUREMENTS

A. Bands:

1. Products: Subject to compliance with requirements, provide the following, or approved equal:
 - a. Childers Products; Bands.
 - b. PABCO Metals Corporation; Bands.
 - c. RPR Products, Inc.; Bands.
2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304; 0.015 inch thick, 1/2 inch wide with closed seal.
3. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, 1/2 inch wide with closed seal.
4. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.

B. Insulation Pins and Hangers:

1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch- diameter shank, length to suit depth of insulation indicated.
 - a. Products: Subject to compliance with requirements, provide the following, or approved equal:
 - 1) AGM Industries, Inc.; CWP-1.
 - 2) GEMCO; CD.
 - 3) Midwest Fasteners, Inc.; CD.
 - 4) Nelson Stud Welding; TPA, TPC, and TPS.
2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick, galvanized-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
 - a. Products: Subject to compliance with requirements, provide the following, or approved equal:
 - 1) AGM Industries, Inc.; RC-150.
 - 2) GEMCO; R-150.
 - 3) Midwest Fasteners, Inc.; WA-150.
 - 4) Nelson Stud Welding; Speed Clips.
 - b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.

C. Wire: 0.080-inch nickel-copper alloy.

1. Manufacturers: Subject to compliance with requirements, provide the following, or approved equal:
 - a. C & F Wire.
 - b. Childers Products.
 - c. PABCO Metals Corporation.
 - d. RPR Products, Inc.

2.10 CORNER ANGLES

- A. Aluminum Corner Angles: 0.040 inch thick, minimum 1 by 1 inch, aluminum according to ASTM B 209, Alloy 3003, 3005, 3105 or 5005; Temper H-14.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.
 1. Verify that systems and equipment to be insulated have been tested and are free of defects.
 2. Verify that surfaces to be insulated are clean and dry.
 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Preparation: 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 between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
- B. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
- C. Mix cements with clean potable water; if cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

- A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment, ducts and fittings, and piping including fittings, valves, and specialties.
- B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, duct system, and 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, soften, or otherwise attack insulation or jacket in either wet or dry state.
- 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. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- 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 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.
 - 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.
 - 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 as recommended by insulation material manufacturer to maintain vapor seal.
 5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct and pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- 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 similar 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. Manholes.
 5. Handholes.
 6. Cleanouts.

3.4 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
1. Seal penetrations with flashing sealant.
 2. 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.
 3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
 4. Seal jacket to roof flashing with flashing sealant.
- B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
1. Seal penetrations with flashing sealant.

2. 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.
 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
 4. Seal jacket to wall flashing with flashing sealant.
- 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. 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.
- E. Insulation Installation at Floor Penetrations:
1. Duct: Install insulation continuously through floor penetrations that are not fire rated. 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.
 2. Pipe: Install insulation continuously through floor penetrations.
 3. Seal penetrations through fire-rated assemblies.

3.5 EQUIPMENT, TANK, AND VESSEL INSULATION INSTALLATION

- A. Mineral Fiber, Pipe and Tank Insulation Installation for Tanks and Vessels: Secure insulation with adhesive and anchor pins and speed washers.
1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of tank and vessel surfaces.
 2. Groove and score insulation materials to fit as closely as possible to equipment, including contours. Bevel insulation edges for cylindrical surfaces for tight joints. Stagger end joints.
 3. Protect exposed corners with secured corner angles.
 4. Install adhesively attached or self-sticking insulation hangers and speed washers on sides of tanks and vessels as follows:
 - a. Do not weld anchor pins to ASME-labeled pressure vessels.
 - b. Select insulation hangers and adhesive that are compatible with service temperature and with substrate.
 - c. On tanks and vessels, maximum anchor-pin spacing is 3 inches from insulation end joints, and 16 inches o.c. in both directions.
 - d. Do not overcompress insulation during installation.
 - e. Cut and miter insulation segments to fit curved sides and domed heads of tanks and vessels.
 - f. Impale insulation over anchor pins and attach speed washers.

- g. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers matching insulation facing.
 - 5. Secure each layer of insulation with stainless-steel or aluminum bands. Select band material compatible with insulation materials.
 - 6. Where insulation hangers on equipment and vessels are not permitted or practical and where insulation support rings are not provided, install a girdle network for securing insulation. Stretch prestressed aircraft cable around the diameter of vessel and make taut with clamps, turnbuckles, or breather springs. Place one circumferential girdle around equipment approximately 6 inches from each end. Install wire or cable between two circumferential girdles 12 inches o.c. Install a wire ring around each end and around outer periphery of center openings, and stretch prestressed aircraft cable radially from the wire ring to nearest circumferential girdle. Install additional circumferential girdles along the body of equipment or tank at a minimum spacing of 48 inches o.c. Use this network for securing insulation with tie wire or bands.
 - 7. Stagger joints between insulation layers at least 3 inches.
 - 8. Install insulation in removable segments on equipment access doors, manholes, handholes, and other elements that require frequent removal for service and inspection.
 - 9. Bevel and seal insulation ends around manholes, handholes, ASME stamps, and nameplates.
 - 10. For equipment with surface temperatures below ambient, apply mastic to open ends, joints, seams, breaks, and punctures in insulation.
- B. Insulation Installation on Pumps:
- 1. Fabricate metal boxes lined with insulation. Fit boxes around pumps and coincide box joints with splits in pump casings. Fabricate joints with outward bolted flanges. Bolt flanges on 6-inch centers, starting at corners. Install 3/8-inch- diameter fasteners with wing nuts. Alternatively, secure the box sections together using a latching mechanism.
 - 2. Fabricate boxes from aluminum, at least 0.060 inch thick.
 - 3. For below ambient services, install a vapor barrier at seams, joints, and penetrations. Seal between flanges with replaceable gasket material to form a vapor barrier.

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.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
- 1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
 - 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with 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 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 used for adjacent pipe. Overlap adjoining pipe insulation by not less than two 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 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 two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with 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 and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 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. 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.
 9. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.
- C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with cement and finish with finishing cement, mastic, and flashing sealant.
- D. Install removable insulation covers at locations indicated. Installation shall conform 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 adjoining pipe insulation.
 2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two 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 cement. Finish cover assembly with 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 FLEXIBLE ELASTOMERIC INSULATION INSTALLATION

- 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.

- B. 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 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.

- C. 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.

- D. 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 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 MINERAL-FIBER INSULATION INSTALLATION

- 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 factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at 6 inches o.c.

4. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but 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 Flanges:

1. Install preformed 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 mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as 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.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered 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.

E. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

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.
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 1 edge and 1 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 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 shall 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 2 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.
- F. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
- 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, space 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. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface.

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 1 edge and 1 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 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 shall 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 2 times the insulation thickness but not less than 3 inches.
5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
6. 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.

3.9 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.
- B. 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.
- C. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. 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.

D. 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.

E. Where PVDC jackets are indicated, install as follows:

1. Apply three separate wraps per insulation section to secure pipe insulation to pipe prior to installation of PVDC jacket.
2. Wrap factory-presized jackets around individual pipe insulation sections with one end overlapping the previously installed sheet. Install presized jacket with an approximate overlap at butt joint of 2 inches over the previous section. Adhere lap seal using adhesive or SSL, and then apply 1-1/4 circumferences around overlapped butt joint.
3. Continuous jacket can be spiral wrapped around a length of pipe insulation. Apply adhesive at overlapped spiral edge. When electing to use adhesives, refer to manufacturer's written instructions for application of adhesives along this spiral edge to maintain a permanent bond.
4. Jacket can be wrapped in cigarette fashion along length of roll for insulation systems with an outer circumference of 33-1/2 inches or less. The 33-1/2-inch- circumference limit allows for 2-inch- overlap seal. Using the length of roll allows for longer sections of jacket to be installed at one time. Use adhesive on the lap seal. Visually inspect lap seal for "fishmouthing," and seal to secure joint.
5. Repair holes or tears in PVDC jacket.

3.10 FIRE-RATED INSULATION SYSTEM INSTALLATION

- A. Where fire-rated insulation system is indicated, secure system to ducts and duct hangers and supports to maintain a continuous fire rating.
- B. Insulate duct access panels and doors to achieve same fire rating as duct.
- C. Install firestopping at penetrations through fire-rated assemblies. Fire-stop systems are specified in Section "Through-Penetration Firestop Systems."

3.11 FINISHES

- A. Duct, Equipment, and Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in painting Sections.
 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. Color: Final color as selected by Commissioner. Vary first and second coats to allow visual inspection of the completed Work.
- D. Do not field paint aluminum or stainless-steel jackets.

3.12 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections:
 - 1. Inspect ductwork, randomly selected by Commissioner, by removing field-applied jacket and insulation in layers in reverse order of their installation.
 - 2. Inspect field-insulated equipment, randomly selected by Commissioner, by removing field-applied jacket and insulation in layers in reverse order of their installation. Inspect pipe, fittings, strainers, and valves, randomly selected by Commissioner, by removing field-applied jacket and insulation in layers in reverse order of their installation.
- D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.13 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 nonconditioned space.
 - 4. Indoor, exposed return located in nonconditioned space.
 - 5. Indoor, concealed, Type I, commercial, kitchen hood exhaust.
 - 6. Indoor, exposed, Type I, commercial, kitchen hood exhaust.
 - 7. Indoor, concealed exhaust between isolation damper and penetration of building exterior.
 - 8. Indoor, exposed exhaust between isolation damper and penetration of building exterior.
 - 9. Outdoor, concealed supply and return.
 - 10. 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.

3.14 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. Concealed, rectangular, supply-air duct insulation shall be Mineral-Fiber Blanket: 1-1/2 inches thick and 1.5-lb/cu. ft. nominal density.
- B. Concealed, rectangular, outdoor-air duct insulation shall be: Mineral-Fiber Blanket: 1-1/2 inches thick and 1.5-lb/cu. ft. nominal density.
- C. Concealed, rectangular, exhaust-air duct insulation between isolation damper and penetration of building exterior shall be Mineral-Fiber Blanket: 1-1/2 inches thick and 1.5-lb/cu. ft. nominal density.
- D. Concealed, Type I, Kitchen Hood Exhaust Duct and Plenum Insulation: 2" calcium silicate insulation with 1" air space separating 10 gauge duct insulation inner surface.
- E. Concealed, supply-air plenum insulation shall be Mineral-Fiber Blanket: 1-1/2 inches thick and 1.5-lb/cu. ft. nominal density.
- F. Concealed, outdoor-air plenum insulation shall be Mineral-Fiber Blanket: 1-1/2 inches thick and 1.5-lb/cu. ft. nominal density.
- G. Exposed, rectangular, supply-air duct insulation shall be Mineral-Fiber Board: 1-1/2 inches thick and 1.5-lb/cu. ft. nominal density.
- H. Exposed, rectangular, outdoor-air duct insulation shall be: Mineral-Fiber Board: 1-1/2 inches thick and 1.5-lb/cu. ft. nominal density.
- I. Exposed, supply-air plenum insulation shall be: Mineral-Fiber Board: 1-1/2 inches thick and 1.5-lb/cu. ft. nominal density.
- J. Exposed, outdoor-air plenum insulation shall be: Mineral-Fiber Board: 1-1/2 inches thick and 1.5-lb/cu. ft. nominal density.
- K. The ducts within curb spaces shall be insulated prior to setting the unit curb in place. Where so, the ducts shall have 1" thick internal acoustical insulation.

3.15 ABOVEGROUND, OUTDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. Insulation materials and thicknesses are identified below.
- B. Exposed, rectangular, supply-air duct insulation shall be: Mineral-Fiber Board: 1-1/2 inches thick and 3-lb/cu. ft. nominal density.
- C. Exposed, rectangular, return-air duct insulation shall be: Mineral-Fiber Board: 1-1/2 inches thick and 3-lb/cu. ft. nominal density.
- D. Provide outdoor field applied jackets on all ducts. Refer to appropriate sections for outdoor field jacket requirements.

3.16 EQUIPMENT INSULATION SCHEDULE

- A. Insulation materials and thicknesses are identified below. If more than one material is listed for a type of equipment, selection from materials listed is Contractor's option.
- B. Insulate indoor and outdoor equipment in paragraphs below that is not factory insulated.
- C. Heating-hot-water pump insulation shall be the following:
 - 1. Mineral-Fiber Board: 2 inches] thick and 3-lb/cu. ft. nominal density.
- D. Heating-hot-water expansion/compression tank insulation shall be the following:
 - 1. Mineral-Fiber Pipe and Tank: 2 inches thick.
- E. Heating-hot-water air-separator insulation shall be the following:
 - 1. Mineral-Fiber Pipe and Tank: 2 inches thick.

3.17 PIPING INSULATION SCHEDULE, GENERAL

- A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range.

3.18 INDOOR PIPING INSULATION SCHEDULE

- A. Heating-Hot-Water Supply and Return, 200 Deg F and below:
 - 1. NPS 1 and Smaller: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe, Type I: 1 inch thick.
 - 2. NPS 1-1/4 to NPS 3: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe, Type I: 1-1/2 inches thick.
 - 3. NPS 4 and Larger: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe, Type I: 2 inches thick.
- B. Refrigerant Suction and Hot-Gas Piping:
 - 1. All Pipe Sizes: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
- C. Refrigerant Suction and Hot-Gas Flexible Tubing:
 - 1. All Pipe Sizes: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
- D. Condensate Drain Piping below 60 def F:
 - 1. All Pipe Sizes: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.

3.19 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

- A. Refrigerant Suction and Hot-Gas Piping: Provide same insulation type listed for indoor installation, with the addition of vapor barrier and, metal jacket and preformed pipe insulation covers at corners and at fittings.
- B. Refrigerant Suction and Hot-Gas Flexible Tubing: Provide same insulation type listed for indoor installation, with the addition of vapor barrier and, metal jacket and preformed pipe insulation covers at corners and at fittings.

3.20 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.
- B. Ducts and Plenums, Exposed:
 - 1. Painted Aluminum, Smooth: 0.032 inch thick.
- C. Equipment, Exposed:
 - 1. Painted Aluminum, Smooth: 0.032 inch thick.
- D. Piping, Exposed:
 - 1. Painted Aluminum, Smooth: 0.032 inch thick.

3.21 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. Ducts and Plenums, Exposed:
 - 1. Aluminum, Corrugated: 0.032 inch thick.
- C. Piping, Exposed:
 - 1. Stainless Steel, Smooth with Locking Seam.

END OF SECTION 23 07 00

SECTION 230713

DUCT INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

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, concealed supply and return.
 - 8. Outdoor, exposed supply and return.
- B. Related Sections:
 - 1. Division 23 Section "HVAC Piping Insulation."
 - 2. Division 23 Section "Metal Ducts" for duct liners.

1.3 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).
- B. LEED Submittals:
 - 1. Product Data for Credit IEQ 4.1: For adhesives and sealants, documentation including printed statement of VOC content.
 - 2. Laboratory Test Reports for Credit IEQ 4: For adhesives and sealants, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. 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 insulation application at elbows, fittings, dampers, specialties and flanges for each type of insulation.
 3. Detail application of field-applied jackets.
 4. Detail application at linkages of control devices.
- D. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use. Sample sizes are as follows:
1. Sheet Form Insulation Materials: 12 inches square.
 2. Sheet Jacket Materials: 12 inches square.
 3. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction 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.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.
- C. 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 Architect. Use materials indicated for the completed Work.
1. Ductwork Mockups:

- a. One 10-foot section each of rectangular and round straight duct.
 - b. One each of a 90-degree mitered round and rectangular elbow, and one each of a 90-degree radius round and rectangular elbow.
 - c. One rectangular branch takeoff and one round branch takeoff from a rectangular duct. One round tee fitting.
 - d. One rectangular and round transition fitting.
 - e. Four support hangers for round and rectangular ductwork.
 - f. Each type of damper and specialty.
2. For each mockup, fabricate cutaway sections to allow observation of application details for insulation materials, adhesives, mastics, attachments, and jackets.
 3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 4. Obtain Architect'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 Architect 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.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Packaging: Insulation material containers shall be marked by manufacturer with 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 Division 23 Section "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.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in "Duct Insulation Schedule, General," "Indoor Duct and Plenum Insulation Schedule," and "Aboveground, Outdoor Duct and Plenum Insulation Schedule" articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type II for sheet materials.
 - 1. Products: Subject to compliance with requirements, **provide** the following:
 - a. Aeroflex USA, Inc.; Aerocel.
 - b. Armacell LLC; AP Armaflex.
 - c. K-Flex USA; Insul-Sheet, K-Flex Gray Duct Liner, and K-FLEX LS.
- G. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type I. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. Products: Subject to compliance with requirements available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. CertainTeed Corp.; SoftTouch Duct Wrap.
 - b. Johns Manville; Microlite.
 - c. Knauf Insulation; Friendly Feel Duct Wrap.
 - d. Manson Insulation Inc.; Alley Wrap.
 - e. Owens Corning; SOFTR All-Service Duct Wrap.
- H. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation without factory-applied jacket [with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. CertainTeed Corp.; Commercial Board.
 - b. Fibrex Insulations Inc.; FBX.
 - c. Johns Manville; 800 Series Spin-Glas.
 - d. Knauf Insulation; Insulation Board.
 - e. Manson Insulation Inc.; AK Board.
 - f. Owens Corning; Fiberglas 700 Series.
- I. Mineral-Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semirigid board material with factory-applied ASJ complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB. Nominal density is 2.5 lb/cu. ft. or more. Thermal conductivity (k-value) at 100 deg F is 0.29 Btu x in./h x sq. ft. x deg F or less. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
- a. CertainTeed Corp.; CrimpWrap.
 - b. Johns Manville; MicroFlex.
 - c. Knauf Insulation; Pipe and Tank Insulation.
 - d. Manson Insulation Inc.; AK Flex.
 - e. Owens Corning; Fiberglas Pipe and Tank Insulation.
- J. Polyolefin: Unicellular, polyethylene thermal plastic insulation. Comply with ASTM C 534 or ASTM C 1427, Type I, Grade 1 for tubular materials and Type II, Grade 1 for sheet materials.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
- a. Armacell LLC; Tubolit.
 - b. Nomaco Insulation; IMCOLOCK, IMCOSHEET, NOMALOCK, and NOMAPLY.

2.2 FIRE-RATED INSULATION SYSTEMS

- A. Fire-Rated Board: Structural-grade, press-molded, xonolite calcium silicate, fireproofing board suitable for operating temperatures up to 1700 deg F. Comply with ASTM C 656, Type II, Grade 6. Tested and certified to provide a 2-hour fire rating by an NRTL acceptable to authorities having jurisdiction.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
- a. Johns Manville; Super Firetemp M.
- B. Fire-Rated Blanket: High-temperature, flexible, blanket insulation with FSK jacket that is tested and certified to provide a 1 or 2 hour fire rating by an NRTL acceptable to authorities having jurisdiction.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. CertainTeed Corp.; FlameChek.
 - b. Johns Manville; Firetemp Wrap.
 - c. Nelson Fire Stop Products; Nelson FSB Flameshield Blanket.
 - d. Thermal Ceramics; FireMaster Duct Wrap.
 - e. 3M; Fire Barrier Wrap Products.
 - f. Unifrax Corporation; FyreWrap.

2.3 ADHESIVES

- A. Materials shall be 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. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. Aeroflex USA, Inc.; Aeroseal.
- b. Armacell LLC; Armaflex 520 Adhesive.
- c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-75.
- d. K-Flex USA; R-373 Contact Adhesive.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

- C. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements available products that may be incorporated into the Work include, but are not limited to, the following:

- a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
- b. Eagle Bridges - Marathon Industries; 225.
- c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.
- d. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale 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. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.
 - b. Eagle Bridges - Marathon Industries; 225.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-50.
 - d. Mon-Eco Industries, Inc.; 22-25.
2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Corning Corporation; 739, Dow Silicone.
 - b. Johns Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
 - c. P.I.C. Plastics, Inc.; Welding Adhesive.
 - d. Speedline Corporation; Polyco VP Adhesive.
2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below ambient services.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.
 - b. Vimasco Corporation; 749.
 2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm at 43-mil dry film thickness.
 3. Service Temperature Range: Minus 20 to plus 180 deg F.
 4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
 5. Color: White.
- C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below ambient services.
1. Products: Subject to compliance with requirements available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-30.
 - b. Eagle Bridges - Marathon Industries; 501.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-35.
 - d. Mon-Eco Industries, Inc.; 55-10.
 2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 35-mil dry film thickness.
 3. Service Temperature Range: 0 to 180 deg F.
 4. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
 5. Color: White.
- D. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below ambient services.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Encacel.
 - b. Eagle Bridges - Marathon Industries; 570.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 60-95/60-96.
 2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm at 30-mil dry film thickness.
 3. Service Temperature Range: Minus 50 to plus 220 deg F.
 4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
 5. Color: White.
- E. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-10.

- b. Eagle Bridges - Marathon Industries; 550.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 46-50.
 - d. Mon-Eco Industries, Inc.; 55-50.
 - e. Vimasco Corporation; WC-1/WC-5.
- 2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms at 0.0625-inch dry film thickness.
 - 3. Service Temperature Range: Minus 20 to plus 180 deg F.
 - 4. Solids Content: 60 percent by volume and 66 percent by weight.
 - 5. Color: White.

2.5 LAGGING ADHESIVES

- A. Description: Comply with MIL-A-3316C, Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.
 - 1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-50 AHV2.
 - b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-36.
 - c. Vimasco Corporation; 713 and 714.
 - 3. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over duct insulation.
 - 4. Service Temperature Range: 0 to plus 180 deg F.
 - 5. Color: White.

2.6 SEALANTS

- A. FSK and Metal Jacket Flashing Sealants:
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
 - b. Eagle Bridges - Marathon Industries; 405.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.
 - d. Mon-Eco Industries, Inc.; 44-05.
 - 2. Materials shall be compatible with insulation materials, jackets, and substrates.
 - 3. Fire- and water-resistant, flexible, elastomeric sealant.

4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: Aluminum.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. ASJ Flashing Sealants, and Vinyl and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: White.
6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.7 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 C 1136, Type I.
 2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
 3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
 4. FSP Jacket: Aluminum-foil, fiberglass-reinforced scrim with polyethylene backing; complying with ASTM C 1136, Type II.
 5. Vinyl Jacket: White vinyl with a permeance of 1.3 perms when tested according to ASTM E 96/E 96M, Procedure A, and complying with NFPA 90A and NFPA 90B.

2.8 FIELD-APPLIED FABRIC-REINFORCING MESH

- A. Woven Glass-Fiber Fabric: Approximately 6 oz./sq. yd. with a thread count of 5 strands by 5 strands/sq. in. for covering ducts.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Chil-Glas No. 5.
 - B. Woven Polyester Fabric: Approximately 1 oz./sq. yd. with a thread count of 10 strands by 10 strands/sq. in., in a Leno weave, for ducts.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Mast-A-Fab.
 - b. Vimasco Corporation; Elastafab 894.
- 2.9 FIELD-APPLIED CLOTHS
- A. Woven Glass-Fiber Fabric: Comply with MIL-C-20079H, Type I, plain weave, and presized a minimum of 8 oz./sq. yd..
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Alpha Associates, Inc.; Alpha-Maritex 84215 and 84217/9485RW, Luben 59.
- 2.10 FIELD-APPLIED JACKETS
- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
 - B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.
 - C. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, 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. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Johns Manville; Zeston.
 - b. P.I.C. Plastics, Inc.; FG Series.
 - c. Proto Corporation; LoSmoke.
 - d. Speedline Corporation; SmokeSafe.
 2. Adhesive: As recommended by jacket material manufacturer.
 3. Color: **Color as selected by Architect.**
 - D. Metal Jacket:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Metal Jacketing Systems.
 - b. ITW Insulation Systems; Aluminum and Stainless Steel Jacketing.
 - c. RPR Products, Inc.; Insul-Mate.
 2. Aluminum Jacket: Comply with ASTM B 209, Alloy 3003, 3005, 3105, or 5005, Temper H-14.
 - a. Sheet and roll stock ready for shop or field sizing.
 - b. Finish and thickness are indicated in field-applied jacket schedules.
 - c. Moisture Barrier for Indoor Applications: 1-mil- thick, heat-bonded polyethylene and kraft paper.
 - d. Moisture Barrier for Outdoor Applications: [3-mil- thick, heat-bonded polyethylene and kraft paper.
 3. Stainless-Steel Jacket: ASTM A 167 or ASTM A 240/A 240M.
 - a. Sheet and roll stock ready for shop or field sizing.
 - b. Material, finish, and thickness are indicated in field-applied jacket schedules.
 - c. Moisture Barrier for Indoor Applications: 1-mil- thick, heat-bonded polyethylene and kraft paper.
 - d. Moisture Barrier for Outdoor Applications: 3-mil- thick, heat-bonded polyethylene and kraft paper.
- E. Self-Adhesive Outdoor Jacket: 60-mil- thick, laminated vapor barrier and waterproofing membrane for installation over insulation located aboveground outdoors; consisting of a rubberized bituminous resin on a crosslaminated polyethylene film covered with white aluminum-foil facing.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Polyguard Products, Inc.; Alumaguard 60.

2.11 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ABI, Ideal Tape Division; 428 AWF ASJ.
 - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
 - c. Compac Corporation; 104 and 105.
 - d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.

2. Width: 3 inches.
 3. Thickness: 11.5 mils.
 4. Adhesion: 90 ounces force/inch in width.
 5. Elongation: 2 percent.
 6. Tensile Strength: 40 lbf/inch in width.
 7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ABI, Ideal Tape Division; 491 AWF FSK.
 - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
 - c. Compac Corporation; 110 and 111.
 - d. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW/SQ.
 2. Width: 3 inches.
 3. Thickness: 6.5 mils.
 4. Adhesion: 90 ounces force/inch in width.
 5. Elongation: 2 percent.
 6. Tensile Strength: 40 lbf/inch in width.
 7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.
- C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ABI, Ideal Tape Division; 370 White PVC tape.
 - b. Compac Corporation; 130.
 - c. Venture Tape; 1506 CW NS.
 2. Width: 2 inches.
 3. Thickness: 6 mils.
 4. Adhesion: 64 ounces force/inch in width.
 5. Elongation: 500 percent.
 6. Tensile Strength: 18 lbf/inch in width.
- D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ABI, Ideal Tape Division; 488 AWF.
 - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
 - c. Compac Corporation; 120.
 - d. Venture Tape; 3520 CW.

2. Width: 2 inches.
3. Thickness: 3.7 mils.
4. Adhesion: 100 ounces force/inch in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch in width.

2.12 SECUREMENTS

A. Bands:

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ITW Insulation Systems; Gerrard Strapping and Seals.
 - b. RPR Products, Inc.; Insul-Mate Strapping, Seals, and Springs.
2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 0.015 inch thick, 3/4 inch wide closed seal.
3. Aluminum: ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch thick, wide with wing seal or closed seal.
4. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.

B. Insulation Pins and Hangers:

1. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch- diameter shank, length to suit depth of insulation indicated.
 - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) AGM Industries, Inc.; CWP-1.
 - 2) GEMCO; CD.
 - 3) Midwest Fasteners, Inc.; CD.
 - 4) Nelson Stud Welding; TPA, TPC, and TPS.
2. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, **0.135-inch-** diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
 - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) AGM Industries, Inc.; CHP-1.
 - 2) GEMCO; Cupped Head Weld Pin.
 - 3) Midwest Fasteners, Inc.; Cupped Head.
 - 4) Nelson Stud Welding; CHP.

3. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
 - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) AGM Industries, Inc.; Tactoo Perforated Base Insul-Hangers.
 - 2) GEMCO; Perforated Base.
 - 3) Midwest Fasteners, Inc.; Spindle.
 - b. Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
 - c. Spindle: Copper- or zinc-coated, low-carbon steel fully annealed, 0.106-inch-diameter shank, length to suit depth of insulation indicated.
 - d. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
4. Nonmetal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate fastened to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
 - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) GEMCO; Nylon Hangers.
 - 2) Midwest Fasteners, Inc.; Nylon Insulation Hangers.
 - Baseplate: Perforated, nylon sheet, 0.030 inch thick by 1-1/2 inches in diameter.
 - b. Spindle: Nylon, 0.106-inch- diameter shank, length to suit depth of insulation indicated, up to 2-1/2 inches.
 - c. Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
5. Self-Sticking-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
 - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) AGM Industries, Inc.; Tactoo Self-Adhering Insul-Hangers.
 - 2) GEMCO; Peel & Press.
 - 3) Midwest Fasteners, Inc.; Self Stick.
 - b. Baseplate: Galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.

- c. Spindle: Copper- or zinc-coated, low-carbon steel, fully annealed, 0.106-inch-diameter shank, length to suit depth of insulation indicated.
 - d. Adhesive-backed base with a peel-off protective cover.
6. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick, galvanized-steel sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
- a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) AGM Industries, Inc.; RC-150.
 - 2) GEMCO; R-150.
 - 3) Midwest Fasteners, Inc.; WA-150.
 - 4) Nelson Stud Welding; Speed Clips.
 - b. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.
7. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.
- a. Manufacturers: Subject to compliance with requirements available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) GEMCO.
 - 2) Midwest Fasteners, Inc.
 - 3)
- C. Staples: Outward-clinching insulation staples, nominal 3/4-inch- wide, stainless steel or Monel.
- D. Wire: 0.080-inch nickel-copper alloy [0.062-inch soft-annealed, stainless steel or 0.062-inch soft-annealed, galvanized steel.
- 1. Manufacturers: Subject to compliance with requirements available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. C & F Wire.

2.13 CORNER ANGLES

- A. PVC Corner Angles: **30 mils** thick, minimum 1 by 1 inch, PVC according to ASTM D 1784, Class 16354-C. White or color-coded to match adjacent surface.
- B. Aluminum Corner Angles: **0.040 inch** thick, minimum 1 by 1 inch, aluminum according to ASTM B 209, Alloy 3003, 3005, 3105, or 5005; Temper H-14.

- C. Stainless-Steel Corner Angles: 0.024 inch thick, minimum 1 by 1 inch, stainless steel according to ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316.

PART 3 - EXECUTION

3.1 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.

3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

3.3 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, soften, or otherwise attack insulation or jacket in either wet or dry state.
- 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.
- 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.
 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 more than 75 percent of its nominal thickness.
- 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.

3.4 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
1. Seal penetrations with flashing sealant.
 2. 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.
 3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches below top of roof flashing.
 4. Seal jacket to roof flashing with flashing sealant.

- B. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
1. Seal penetrations with flashing sealant.
 2. 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.
 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches.
 4. Seal jacket to wall flashing with flashing sealant.
- 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 Division 07 Section "Penetration Firestopping" firestopping and fire-resistive joint sealers.
- 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.
 2. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.5 INSTALLATION OF FLEXIBLE ELASTOMERIC 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.

3.6 INSTALLATION OF MINERAL-FIBER INSULATION

- A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
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 shall 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.
- B. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
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, space 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. 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 shall 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. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
6. 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.

3.7 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.
- B. 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.
- C. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. 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.
- D. 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.

3.8 FIRE-RATED INSULATION SYSTEM INSTALLATION

- A. Where fire-rated insulation system is indicated, secure system to ducts and duct hangers and supports to maintain a continuous fire rating.
- B. Insulate duct access panels and doors to achieve same fire rating as duct.
- C. Install firestopping at penetrations through fire-rated assemblies. Fire-stop systems are specified in Division 07 Section "Penetration Firestopping."

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 Division 09 painting Sections.
 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. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
- D. Do not field paint aluminum or stainless-steel jackets.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

- B. Perform tests and inspections.
- C. Tests and Inspections:
 - 1. Inspect ductwork, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each duct system defined in the "Duct Insulation Schedule, General" Article.
- D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.11 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, concealed supply and return.
 - 8. 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.

3.12 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. Concealed, round and flat-oval, supply-air duct insulation shall be one of the following:
 - 1. Mineral-Fiber Blanket: 1-1/2 inches thick and 0.75-lb/cu. ft. nominal density.
 - 2. Mineral-Fiber Board: 1-1/2 inches nominal density.
- B. Concealed, rectangular, supply-air duct insulation shall be one of the following:
 - 1. Mineral-Fiber Blanket: 1-1/2 inches nominal density.
 - 2. Mineral-Fiber Board: 1-1/2 inches thick and 2-lb/cu. ft. nominal density.
- C. Concealed, rectangular, return-air duct insulation shall be one of the following:
 - 1. Mineral-Fiber Blanket: 1-1/2 inches nominal density.

2. Mineral-Fiber Board: 1-1/2 inches thick and 2-lb/cu. ft. nominal density.
- D. Concealed, rectangular, outdoor-air duct insulation shall be one of the following:
 1. Mineral-Fiber Blanket: 1-1/2 inches thick and .75-lb/cu. ft. nominal density.
 2. Mineral-Fiber Board: 1-1/2 inches thick and 2-lb/cu. ft. nominal density.
- E. Concealed, rectangular, exhaust-air duct insulation between isolation damper and penetration of building exterior shall be one of the following:
 1. Mineral-Fiber Blanket: 1-1/2 inches nominal density.
 2. Mineral-Fiber Board: 1-1/2 inches thick and 2-lb/cu. ft. nominal density.
- F. Concealed, supply-air plenum insulation shall be one of the following:
 1. Mineral-Fiber Blanket: 1-1/2 inches nominal density.
 2. Mineral-Fiber Board: 1-1/2 inches thick and 2-lb/cu. ft. nominal density.
- G. Concealed, return-air plenum insulation shall be one of the following:
 1. Mineral-Fiber Blanket: 1-1/2 inches nominal density.
 2. Mineral-Fiber Board: 1-1/2 inches thick and 2-lb/cu. ft. nominal density.
- H. Concealed, outdoor-air plenum insulation shall be one of the following:
 1. Mineral-Fiber Blanket: 1-1/2 inches nominal density.
 2. Mineral-Fiber Board: 1-1/2 inches thick and 2-lb/cu. ft. nominal density.
- I. Concealed, exhaust-air plenum insulation shall be one of the following:
 1. Mineral-Fiber Blanket: 1-1/2 inches thick and 1.5-lb/cu. ft. nominal density.
 2. Mineral-Fiber Board: 1-1/2 inches thick and 3-lb/cu. ft. nominal density.
- J. Exposed, round and flat-oval, supply-air duct insulation shall be one of the following:
 1. Mineral-Fiber Blanket: 1-1/2 inches nominal density.
 2. Mineral-Fiber Board: 1-1/2 inches thick and 2-lb/cu. ft. nominal density.
- K. Exposed, round and flat-oval, return-air duct insulation shall be one of the following:
 1. Mineral-Fiber Blanket: 1-1/2 inches nominal density.
 2. Mineral-Fiber Board: 1-1/2 inches thick and 2-lb/cu. ft. nominal density.

3.13 ABOVEGROUND, OUTDOOR DUCT AND PLENUM INSULATION SCHEDULE

- A. Insulation materials and thicknesses are identified below. If more than one material is listed for a duct system, selection from materials listed is Contractor's option.
- B. Concealed, round and flat-oval, supply-air duct insulation shall be one of the following:
 1. Mineral-Fiber Blanket: 2 inches and 0.75-lb/cu. ft. nominal density.
 2. Mineral-Fiber Board: 2 inches thick and 2-lb/cu. ft. nominal density.
- C. Concealed, round and flat-oval, return-air duct insulation shall be one of the following:
 1. Mineral-Fiber Blanket: 2 inches and 0.75-lb/cu. ft. nominal density.

2. Mineral-Fiber Board: 2 inches thick and 2-lb/cu. ft. nominal density.

3.14 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. None.
 2. PVC, Color-Coded by System 20 mils thick.
 3. Aluminum, Corrugated: 0.016 inch thick.
 4. Painted Aluminum, Corrugated: 0.016 inch thick.
 5. Stainless Steel, Type 304 or Corrugated thick.

END OF SECTION 230713

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 230719

HVAC PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes insulating the following HVAC piping systems:
 - 1. Condensate drain piping, indoors and outdoors.
 - 2. Heating hot-water piping, indoors and outdoors.
 - 3. Refrigerant suction and hot-gas piping, indoors and outdoors.
- B. Related Sections:
 - 1. Division 23 Section "Duct Insulation."
 - 2. Division 23 Section "Underground Hydronic Piping" for loose-fill pipe insulation in underground piping outside the building.
 - 3. Division 33 Section "Underground Steam and Condensate Distribution Piping" for loose-fill pipe insulation in underground piping outside the building.

1.3 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).
- B. LEED Submittals:
 - 1. Product Data for Credit IEQ 4.1: For adhesives and sealants, documentation including printed statement of VOC content.
 - 2. Laboratory Test Reports for Credit IEQ 4: For adhesives and sealants, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. 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.
 6. Detail application of field-applied jackets.
 7. Detail application at linkages of control devices.
- D. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use.
1. Preformed Pipe Insulation Materials: 12 inches (300 mm) long by NPS 2 (DN 50).
 2. Sheet Form Insulation Materials: 12 inches (300 mm) square.
 3. Jacket Materials for Pipe: 12 inches (300 mm) long by NPS 2 (DN 50).
 4. Sheet Jacket Materials: 12 inches (300 mm) square.
 5. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction 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.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.
- B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.
1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.
- C. 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 Architect. Use materials indicated for the completed Work.
1. Piping Mockups:
 - a. One 10-foot (3-m) section of NPS 2 (DN 50) 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 (DN 50) or smaller valve, and one NPS 2-1/2 (DN 65) 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.
 2. For each mockup, fabricate cutaway sections to allow observation of application details for insulation materials, adhesives, mastics, attachments, and jackets.
 3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 4. Obtain Architect'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 Architect 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.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Packaging: Insulation material containers shall be marked by manufacturer with 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 Division 23 Section "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.

- 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.
- B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

- A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.
- B. Products shall not contain asbestos, lead, mercury, or mercury compounds.
- C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
- D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
- E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
- F. Calcium Silicate:
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Industrial Insulation Group (IIG); Thermo-12 Gold.
 - 2. Preformed Pipe Sections: Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C 533, Type I.

3. Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C 533, Type I.
 4. Prefabricated Fitting Covers: Comply with ASTM C 450 and ASTM C 585 for dimensions used in preforming insulation to cover valves, elbows, tees, and flanges.
- G. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
1. Products: Subject to compliance with requirements,
 2. All available products that may be incorporated into the Work include, but are not limited to the following:
 - a. Pittsburgh Corning Corporation; Foamglas.
 - b. Block Insulation: ASTM C 552, Type I.
 - c. Special-Shaped Insulation: ASTM C 552, Type III.
 - d. Board Insulation: ASTM C 552, Type IV.
 - e. If retaining both types of insulation in first two subparagraphs below, indicate where each type applies in insulation system schedules.
 - f. Preformed Pipe Insulation without Jacket: Comply with ASTM C 552, Type II, Class 1.
 - g. Preformed Pipe Insulation with Factory-Applied ASJ: Comply with ASTM C 552, Type II, Class 2.
 - h. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
- H. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.
1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Aeroflex USA, Inc.; Aerocel.
 - b. Armacell LLC; AP Armaflex.
 - c. K-Flex USA; Insul-Lock, Insul-Tube, and K-FLEX LS.
- I. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. CertainTeed Corp.; SoftTouch Duct Wrap.

- b. Johns Manville; Microlite.
- c. Knauf Insulation; Friendly Feel Duct Wrap.
- d. Manson Insulation Inc.; Alley Wrap.
- e. Owens Corning; SOFTR All-Service Duct Wrap.

J. Mineral-Fiber, Preformed Pipe Insulation:

1. Products: Subject to compliance with requirements.
2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fibrex Insulations Inc.; Coreplus 1200.
 - b. Johns Manville; Micro-Lok.
 - c. Knauf Insulation; 1000-Degree Pipe Insulation.
 - d. Manson Insulation Inc.; Alley-K.
 - e. Owens Corning; Fiberglas Pipe Insulation.
3. Type I, 850 deg F (454 deg C) Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
4. Type II, 1200 deg F (649 deg C) Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type II, Grade A, Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

K. Mineral-Fiber, Pipe Insulation Wicking System: Preformed pipe insulation complying with ASTM C 547, Type I, Grade A, with absorbent cloth factory-applied to the entire inside surface of preformed pipe insulation and extended through the longitudinal joint to outside surface of insulation under insulation jacket. Factory apply a white, polymer, vapor-retarder jacket with self-sealing adhesive tape seam and evaporation holes running continuously along the longitudinal seam, exposing the absorbent cloth.

1. Products: Subject to compliance with requirements.
2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Knauf Insulation; Permawick Pipe Insulation.
 - b. Owens Corning; VaporWick Pipe Insulation.

L. Mineral-Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semirigid board material with factory-applied ASJ complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB. Nominal density is 2.5 lb/cu. ft. (40 kg/cu. m) or more. Thermal conductivity (k-value) at 100 deg F (55 deg C) is 0.29 Btu x in./h x sq. ft. x deg F (0.042 W/m x K) or less. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements.

2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. CertainTeed Corp.; CrimpWrap.
 - b. Johns Manville; MicroFlex.
 - c. Knauf Insulation; Pipe and Tank Insulation.
 - d. Manson Insulation Inc.; AK Flex.
 - e. Owens Corning; Fiberglas Pipe and Tank Insulation.

M. Phenolic:

1. Products: Subject to compliance with requirements.
2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Kingspan Tarec Industrial Insulation NV; Koolphen K.
 - b. Resolco International BV; Insul-phen.
3. Preformed pipe insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type III, Grade 1.
4. Block insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type II, Grade 1.
5. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
6. Factory-Applied Jacket: Requirements are specified in "Factory-Applied Jackets" Article.
 - a. Preformed Pipe Insulation: ASJ.

N. Polyisocyanurate: Unfaced, preformed, rigid cellular polyisocyanurate material intended for use as thermal insulation.

1. Products: Subject to compliance with requirements.
2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Chemical Company (The); Trymer 2000 XP.
 - b. Duna USA Inc.; Corafoam.
 - c. Dyplast Products; ISO-25.
 - d. Elliott Company of Indianapolis; Elfoam.
3. Comply with ASTM C 591, Type I or Type IV, except thermal conductivity (k-value) shall not exceed 0.19 Btu x in./h x sq. ft. x deg F (0.027 W/m x K) at 75 deg F (24 deg C) after 180 days of aging.
4. Flame-spread index shall be 25 or less, and smoke-developed index shall be 50 or less for thickness up to 1 inch (25 mm) as tested by ASTM E 84.
5. Fabricate shapes according to ASTM C 450 and ASTM C 585.

6. Factory-Applied Jacket: Requirements are specified in "Factory-Applied Jackets" Article.
 - a. Pipe Applications: ASJ.
- O. Polyolefin: Unicellular, polyethylene thermal plastic insulation. Comply with ASTM C 534 or ASTM C 1427, Type I, Grade 1 for tubular materials and Type II, Grade 1 for sheet materials.
 1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Armacell LLC; Tubolit.
 - b. Nomaco Insulation; IMCOLOCK, IMCOSHEET, NOMALOCK, and NOMAPLY.
- P. Polystyrene: Rigid, extruded cellular polystyrene intended for use as thermal insulation. Comply with ASTM C 578, Type IV or Type XIII, except thermal conductivity (k-value) shall not exceed 0.26 Btu x in./h x sq. ft. x deg F (0.038 W/m x K) after 180 days of aging. Fabricate shapes according to ASTM C 450 and ASTM C 585.
 1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Chemical Company (The); Styrofoam.

2.2 INSULATING CEMENTS

- A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.
 1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Ramco Insulation, Inc.; Super-Stik.
- B. Expanded or Exfoliated Vermiculite Insulating Cement: Comply with ASTM C 196.
 1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:

- a. Ramco Insulation, Inc.; Thermokote V.
 - C. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449.
 - 1. Products: Subject to compliance with requirements.
 - 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Ramco Insulation, Inc.; Ramcote 1200 and Quik-Cote.
- 2.3 ADHESIVES
- A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated unless otherwise indicated.
 - B. Calcium Silicate Adhesive: Fibrous, sodium-silicate-based adhesive with a service temperature range of 50 to 800 deg F (10 to 427 deg C).
 - 1. Products: Subject to compliance with requirements.
 - 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-97.
 - b. Eagle Bridges - Marathon Industries; 290.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 81-27.
 - d. Mon-Eco Industries, Inc.; 22-30.
 - e. Vimasco Corporation; 760.
 - 3. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 4. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 - C. Cellular-Glass Adhesive: Two-component, thermosetting urethane adhesive containing no flammable solvents, with a service temperature range of minus 100 to plus 200 deg F (minus 73 to plus 93 deg C).
 - 1. Products: Subject to compliance with requirements.
 - 2. All available products that may be incorporated into the Work include, but are not limited to, the following:

- a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 81-84.
 3. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 4. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- D. Phenolic and Polyisocyanurate Adhesive: Solvent-based resin adhesive, with a service temperature range of minus 75 to plus 300 deg F (minus 59 to plus 149 deg C).
1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-96.
 - b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 81-33.
 3. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 4. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Aeroflex USA, Inc.; Aeroseal.
 - b. Armacell LLC; Armaflex 520 Adhesive.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-75.
 - d. K-Flex USA; R-373 Contact Adhesive.
 3. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 4. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- F. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.
 - b. Eagle Bridges - Marathon Industries; 225.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.
 - d. Mon-Eco Industries, Inc.; 22-25.
 3. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 4. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- G. Polystyrene Adhesive: Solvent- or water-based, synthetic resin adhesive with a service temperature range of minus 20 to plus 140 deg F (29 to plus 60 deg C).
1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-96.
 - b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60.
- H. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.
 - b. Eagle Bridges - Marathon Industries; 225.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-50.
 - d. Mon-Eco Industries, Inc.; 22-25.
 3. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

4. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

I. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements.
2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Corning Corporation; 739, Dow Silicone.
 - b. Johns Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
 - c. P.I.C. Plastics, Inc.; Welding Adhesive.
 - d. Speedline Corporation; Polyco VP Adhesive.
3. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
4. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.

1. Products: Subject to compliance with requirements.
2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.
 - b. Vimasco Corporation; 749.
3. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm (0.009 metric perm) at 43-mil (1.09-mm) dry film thickness.
4. Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C).
5. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.
6. Color: White.

- C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below-ambient services.
1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-30.
 - b. Eagle Bridges - Marathon Industries; 501.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-35.
 - d. Mon-Eco Industries, Inc.; 55-10.
 3. Water-Vapor Permeance: ASTM F 1249, 0.05 perm (0.03 metric perm) at 35-mil (0.9-mm) dry film thickness.
 4. Service Temperature Range: 0 to 180 deg F (Minus 18 to plus 82 deg C).
 5. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
 6. Color: White.
- D. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below-ambient services.
1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Encacel.
 - b. Eagle Bridges - Marathon Industries; 570.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 60-95/60-96.
 3. Water-Vapor Permeance: ASTM F 1249, 0.05 perm (0.033 metric perm) at 30-mil (0.8-mm) dry film thickness.
 4. Service Temperature Range: Minus 50 to plus 220 deg F (Minus 46 to plus 104 deg C).
 5. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
 6. Color: White.
- E. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.
1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-10.

- b. Eagle Bridges - Marathon Industries; 550.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 46-50.
 - d. Mon-Eco Industries, Inc.; 55-50.
 - e. Vimasco Corporation; WC-1/WC-5.
- 3. Water-Vapor Permeance: ASTM F 1249, 1.8 perms (1.2 metric perms) at 0.0625-inch (1.6-mm) dry film thickness.
 - 4. Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C).
 - 5. Solids Content: 60 percent by volume and 66 percent by weight.
 - 6. Color: White.

2.5 LAGGING ADHESIVES

- A. Description: Comply with MIL-A-3316C, Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.
 - 1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Products: Subject to compliance with requirements.
 - 3. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-50 AHV2.
 - b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-36.
 - c. Vimasco Corporation; 713 and 714.
 - 4. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.
 - 5. Service Temperature Range: 0 to plus 180 deg F (Minus 18 to plus 82 deg C).
 - 6. Color: White.

2.6 SEALANTS

- A. Joint Sealants:
 - 1. Joint Sealants for Cellular-Glass, Phenolic, and Polyisocyanurate Products: Subject to compliance with requirements.
 - 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.

- b. Eagle Bridges - Marathon Industries; 405.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-45.
 - d. Mon-Eco Industries, Inc.; 44-05.
 - e. Pittsburgh Corning Corporation; Pittseal 444.
 3. Joint Sealants for Polystyrene Products: Subject to compliance with requirements.
 4. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-70.
 - b. Eagle Bridges - Marathon Industries; 405.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-45.
 - d. Mon-Eco Industries, Inc.; 44-05.
 5. Materials shall be compatible with insulation materials, jackets, and substrates.
 6. Permanently flexible, elastomeric sealant.
 7. Service Temperature Range: Minus 100 to plus 300 deg F (Minus 73 to plus 149 deg C).
 8. Color: White or gray.
 9. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 10. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. FSK and Metal Jacket Flashing Sealants:
1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
 - b. Eagle Bridges - Marathon Industries; 405.
 - c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.
 - d. Mon-Eco Industries, Inc.; 44-05.
 3. Materials shall be compatible with insulation materials, jackets, and substrates.
 4. Fire- and water-resistant, flexible, elastomeric sealant.
 5. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).
 6. Color: Aluminum.
 7. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

8. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:
1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.
 3. Materials shall be compatible with insulation materials, jackets, and substrates.
 4. Fire- and water-resistant, flexible, elastomeric sealant.
 5. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).
 6. Color: White.
 7. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 8. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.7 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 C 1136, Type I.
 2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
 3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
 4. FSP Jacket: Aluminum-foil, fiberglass-reinforced scrim with polyethylene backing; complying with ASTM C 1136, Type II.
 5. PVDC Jacket for Indoor Applications: 4-mil- (0.10-mm-) thick, white PVDC biaxially oriented barrier film with a permeance at 0.02 perm (0.013 metric perm) when tested according to ASTM E 96/E 96M and with a flame-spread index of 5 and a smoke-developed index of 20 when tested according to ASTM E 84.
 - a. Products: Subject to compliance with requirements.
 - b. All available products that may be incorporated into the Work include, but are not limited to, the following:

- 1) Dow Chemical Company (The); Saran 540 Vapor Retarder Film and Saran 560 Vapor Retarder Film.
6. PVDC Jacket for Outdoor Applications: 6-mil- (0.15-mm-) thick, white PVDC biaxially oriented barrier film with a permeance at 0.01 perm (0.007 metric perm) when tested according to ASTM E 96/E 96M and with a flame-spread index of 5 and a smoke-developed index of 25 when tested according to ASTM E 84.
 - a. Products: Subject to compliance with requirements.
 - b. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Dow Chemical Company (The); Saran 540 Vapor Retarder Film and Saran 560 Vapor Retarder Film.
7. PVDC-SSL Jacket: PVDC jacket with a self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip.
 - a. Products: Subject to compliance with requirements.
 - b. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Dow Chemical Company (The); Saran 540 Vapor Retarder Film and Saran 560 Vapor Retarder Film.
8. Vinyl Jacket: White vinyl with a permeance of 1.3 perms (0.86 metric perms) when tested according to ASTM E 96/E 96M, Procedure A, and complying with NFPA 90A and NFPA 90B.

2.8 FIELD-APPLIED FABRIC-REINFORCING MESH

- A. Woven Glass-Fiber Fabric: Approximately 2 oz./sq. yd. (68 g/sq. m) with a thread count of 10 strands by 10 strands/sq. in. (4 strands by 4 strands/sq. mm) for covering pipe and pipe fittings.
 1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Chil-Glas Number 10.
- B. Woven Polyester Fabric: Approximately 1 oz./sq. yd. (34 g/sq. m) with a thread count of 10 strands by 10 strands/sq. in. (4 strands by 4 strands/sq. mm), in a Leno weave, for pipe.

1. Products: Subject to compliance with requirements.
2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Mast-A-Fab.
 - b. Vimasco Corporation; Elastafab 894.

2.9 FIELD-APPLIED CLOTHS

- A. Woven Glass-Fiber Fabric: Comply with MIL-C-20079H, Type I, plain weave, and presized a minimum of 8 oz./sq. yd. (271 g/sq. m).
 1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Alpha Associates, Inc.; Alpha-Maritex 84215 and 84217/9485RW, Luben 59.

2.10 FIELD-APPLIED JACKETS

- A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
- B. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.
- C. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, 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. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Johns Manville; Zeston.
 - b. P.I.C. Plastics, Inc.; FG Series.
 - c. Proto Corporation; LoSmoke.
 - d. Speedline Corporation; SmokeSafe.
 3. Adhesive: As recommended by jacket material manufacturer.
 4. Color: White Color-code jackets based on system. Color as selected by Architect.
 5. 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.

D. Metal Jacket:

1. Products: Subject to compliance with requirements.
2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Metal Jacketing Systems.
 - b. ITW Insulation Systems; Aluminum and Stainless Steel Jacketing.
 - c. RPR Products, Inc.; Insul-Mate.
3. Aluminum Jacket: Comply with ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005, Temper H-14.
 - a. Factory cut and rolled to size.
 - b. Finish and thickness are indicated in field-applied jacket schedules.
 - c. Moisture Barrier for Indoor Applications: 1-mil (0.025-mm) thick, heat-bonded polyethylene and kraft paper.
 - d. Moisture Barrier for Outdoor Applications: 3-mil (0.075-mm) thick, heat-bonded polyethylene and kraft paper.
 - e. Factory-Fabricated Fitting Covers:
 - 1) Same material, finish, and thickness as jacket.
 - 2) Preformed 2-piece or gore, 45 and 90-degree, short- and long-radius elbows.
 - 3) Tee covers.
 - 4) Flange and union covers.
 - 5) End caps.
 - 6) Beveled collars.
 - 7) Valve covers.
 - 8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.
4. Stainless-Steel Jacket: ASTM A 167 or ASTM A 240/A 240M.
 - a. Sheet and roll stock ready for shop or field sizing.
 - b. Material, finish, and thickness are indicated in field-applied jacket schedules.
 - c. Moisture Barrier for Indoor Applications: polyethylene and kraft paper 3-mil (0.075-mm) thick, heat-bonded polyethylene and kraft paper.
 - d. Moisture Barrier for Outdoor Applications: 3-mil (0.075-mm) thick, heat-bonded polyethylene and kraft paper.
 - e. Factory-Fabricated Fitting Covers:
 - 1) Same material, finish, and thickness as jacket.

- 2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
 - 3) Tee covers.
 - 4) Flange and union covers.
 - 5) End caps.
 - 6) Beveled collars.
 - 7) Valve covers.
 - 8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.
- E. Underground Direct-Buried Jacket: 125-mil- (3.2-mm-) thick vapor barrier and waterproofing membrane consisting of a rubberized bituminous resin reinforced with a woven-glass fiber or polyester scrim and laminated aluminum foil.
1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Pittsburgh Corning Corporation; Pittwrap.
 - b. Polyguard Products, Inc.; Insulrap No Torch 125.
- F. Self-Adhesive Outdoor Jacket: 60-mil (1.5-mm) thick, laminated vapor barrier and waterproofing membrane for installation over insulation located aboveground outdoors; consisting of a rubberized bituminous resin on a cross laminated polyethylene film covered with white, stucco-embossed aluminum-foil facing.
1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Polyguard Products, Inc.; Alumaguard 60.
- G. PVDC Jacket for Indoor Applications: 4-mil (0.10-mm) thick, white PVDC biaxially oriented barrier film with a permeance at 0.02 perms (0.013 metric perms) when tested according to ASTM E 96/E 96M and with a flame-spread index of 5 and a smoke-developed index of 20 when tested according to ASTM E 84.
1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Chemical Company (The); Saran 540 Vapor Retarder Film.
- H. PVDC Jacket for Outdoor Applications: 6-mil (0.15-mm) thick, white PVDC biaxially oriented barrier film with a permeance at 0.01 perms (0.007 metric perms) when tested according to

ASTM E 96/E 96M and with a flame-spread index of 5 and a smoke-developed index of 25 when tested according to ASTM E 84.

1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Chemical Company (The); Saran 560 Vapor Retarder Film.
- I. PVDC-SSL Jacket: PVDC jacket with a self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip.
1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Chemical Company (The); Saran 540 Vapor Retarder Film and Saran 560 Vapor Retarder Film.

2.11 TAPES

- A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ABI, Ideal Tape Division; 428 AWF ASJ.
 - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.
 - c. Compac Corporation; 104 and 105.
 - d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.
 3. Width: 3 inches (75 mm).
 4. Thickness: 11.5 mils (0.29 mm).
 5. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
 6. Elongation: 2 percent.
 7. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
 8. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
- B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
1. Products: Subject to compliance with requirements.

2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ABI, Ideal Tape Division; 491 AWF FSK.
 - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.
 - c. Compac Corporation; 110 and 111.
 - d. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW/SQ.
 3. Width: 3 inches (75 mm).
 4. Thickness: 6.5 mils (0.16 mm).
 5. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.
 6. Elongation: 2 percent.
 7. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.
 8. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.
- C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.
1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ABI, Ideal Tape Division; 370 White PVC tape.
 - b. Compac Corporation; 130.
 - c. Venture Tape; 1506 CW NS.
 3. Width: 2 inches (50 mm).
 4. Thickness: 6 mils (0.15 mm).
 5. Adhesion: 64 ounces force/inch (0.7 N/mm) in width.
 6. Elongation: 500 percent.
 7. Tensile Strength: 18 lbf/inch (3.3 N/mm) in width.
- D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ABI, Ideal Tape Division; 488 AWF.
 - b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
 - c. Compac Corporation; 120.
 - d. Venture Tape; 3520 CW.
 3. Width: 2 inches (50 mm).
 4. Thickness: 3.7 mils (0.093 mm).
 5. Adhesion: 100 ounces force/inch (1.1 N/mm) in width.

6. Elongation: 5 percent.
 7. Tensile Strength: 34 lbf/inch (6.2 N/mm) in width.
- E. PVDC Tape for Indoor Applications: White vapor-retarder PVDC tape with acrylic adhesive.
1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Chemical Company (The); Saran 540 Vapor Retarder Tape.
 3. Width: 3 inches (75 mm).
 4. Film Thickness: 4 mils (0.10 mm).
 5. Adhesive Thickness: 1.5 mils (0.04 mm).
 6. Elongation at Break: 145 percent.
 7. Tensile Strength: 55 lbf/inch (10.1 N/mm) in width.
- F. PVDC Tape for Outdoor Applications: White vapor-retarder PVDC tape with acrylic adhesive.
1. Products: Subject to compliance with requirements.
 2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Dow Chemical Company (The); Saran 560 Vapor Retarder Tape.
 3. Width: 3 inches (75 mm).
 4. Film Thickness: 6 mils (0.15 mm).
 5. Adhesive Thickness: 1.5 mils (0.04 mm).
 6. Elongation at Break: 145 percent.
 7. Tensile Strength: 55 lbf/inch (10.1 N/mm) in width.

2.12 SECUREMENTS

A. Bands:

1. Products: Subject to compliance with requirements.
2. All available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. ITW Insulation Systems; Gerrard Strapping and Seals.
 - b. RPR Products, Inc.; Insul-Mate Strapping, Seals, and Springs.
3. Aluminum: ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch (0.51 mm) thick, 3/4 inch (19 mm) wide with closed seal.

4. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.
- B. Staples: Outward-clinching insulation staples, nominal 3/4-inch- (19-mm-) wide, stainless steel or Monel.
- C. Wire: [0.080-inch (2.0-mm) nickel-copper alloy.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. C & F Wire.

PART 3 - EXECUTION

3.1 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.
 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
- B. Surface Preparation: 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 (0.127 mm) thick and an epoxy finish 5 mils (0.127 mm) thick if operating in a temperature range between 140 and 300 deg F (60 and 149 deg C). 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 between 32 and 300 deg F (0 and 149 deg C) with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
- C. Coordinate insulation installation with the trade 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.

3.3 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 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, soften, or otherwise attack insulation or jacket in either wet or dry state.
- 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. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
- G. Keep insulation materials dry during application and finishing.
- 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 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.
 - 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.

2. Cover circumferential joints with 3-inch- (75-mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.
 3. Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). 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 (50 mm)] [4 inches (100 mm)] 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 pipe flanges and fittings.
- M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
- 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 (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar 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. Manholes.
 5. Handholes.
 6. Cleanouts.

3.4 PENETRATIONS

- A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
1. Seal penetrations with flashing sealant.
 2. 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.
 3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches (50 mm) below top of roof flashing.
 4. Seal jacket to roof flashing with flashing sealant.

- 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. Seal penetrations with flashing sealant.
 - 2. 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.
 - 3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches (50 mm).
 - 4. Seal jacket to wall flashing with flashing sealant.
- 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 Division 07 Section "Penetration Firestopping" for firestopping and fire-resistive joint sealers.
- F. Insulation Installation at Floor Penetrations:
 - 1. Pipe: Install insulation continuously through floor penetrations.
 - 2. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.5 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.
- B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
 - 1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.
 - 2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be 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 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 used for adjacent pipe. Overlap adjoining pipe insulation by not less than two 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 two 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 and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 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.
 9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.
- 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 shall conform 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 adjoining pipe insulation.
 2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two 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 (50 mm) 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.

3.6 INSTALLATION OF CALCIUM SILICATE INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure single-layer insulation with stainless-steel bands at 12-inch (300-mm) intervals and tighten bands without deforming insulation materials.
2. Install two-layer insulation with joints tightly butted and staggered at least 3 inches (75 mm). Secure inner layer with wire spaced at 12-inch (300-mm) intervals. Secure outer layer with stainless-steel bands at 12-inch (300-mm) intervals.
3. Apply a skim coat of mineral-fiber, hydraulic-setting cement to insulation surface. When cement is dry, apply flood coat of lagging adhesive and press on one layer of glass cloth or tape. Overlap edges at least 1 inch (25 mm). Apply finish coat of lagging adhesive over glass cloth or tape. Thin finish coat to achieve smooth, uniform finish.

B. Insulation Installation on Pipe Flanges:

1. Install preformed 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 block insulation of same material and thickness as pipe insulation.
4. Finish flange insulation same as pipe insulation.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When preformed insulation sections of insulation are not available, install mitered sections of calcium silicate insulation. Secure insulation materials with wire or bands.
3. Finish fittings insulation same as pipe insulation.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install mitered segments of calcium silicate insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
2. Install insulation to flanges as specified for flange insulation application.

3. Finish valve and specialty insulation same as pipe insulation.

3.7 INSTALLATION OF CELLULAR-GLASS INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of 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 factory-applied jackets on above-ambient services, secure laps with outward-clinched staples at 6 inches (150 mm) o.c.
4. For insulation with factory-applied jackets on below-ambient services, 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 Flanges:

1. Install preformed 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 cellular-glass block insulation of same thickness as pipe insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch (25 mm), and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of cellular-glass insulation to valve body.
2. 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.

3.8 INSTALLATION OF FLEXIBLE ELASTOMERIC 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.

B. 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 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.

C. 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.

D. 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 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.

3.9 INSTALLATION OF MINERAL-FIBER 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 factory-applied jackets on above-ambient surfaces, secure laps with outward-clinched staples at 6 inches (150 mm) o.c.
4. For insulation with factory-applied 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 Flanges:

1. Install preformed 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 mineral-fiber blanket insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch (25 mm), and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as 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.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered 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.

3.10 INSTALLATION OF PHENOLIC INSULATION

A. General Installation Requirements:

1. Secure single-layer insulation with stainless-steel bands at 12-inch (300-mm) intervals and tighten bands without deforming insulation materials.
2. Install 2-layer insulation with joints tightly butted and staggered at least 3 inches (75 mm). Secure inner layer with 0.062-inch (1.6-mm) wire spaced at 12-inch (300-mm) intervals. Secure outer layer with stainless-steel bands at 12-inch (300-mm) intervals.

B. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of 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 factory-applied jackets on above-ambient services, secure laps with outward-clinched staples at 6 inches (150 mm) o.c.
4. For insulation with factory-applied jackets with vapor retarders on below-ambient services, 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.

C. Insulation Installation on Pipe Flanges:

1. Install preformed 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 block insulation of same material and thickness as pipe insulation.

D. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.

E. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.
2. 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.

3.11 INSTALLATION OF POLYISOCYANURATE INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with tape or bands and tighten without deforming insulation materials. Orient longitudinal joints between half sections in 3- and 9-o'clock positions on the pipe.
2. For insulation with factory-applied jackets with vapor barriers, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive or tape as recommended by insulation material manufacturer and seal with vapor-barrier mastic.
3. All insulation shall be tightly butted and free of voids and gaps at all joints. Vapor barrier must be continuous. Before installing jacket material, install vapor-barrier system.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, same thickness of adjacent pipe insulation, not to exceed 1-1/2-inch (38-mm) thickness.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polyisocyanurate block insulation of same thickness as pipe insulation.

C. Insulation Installation on Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of polyisocyanurate insulation to valve body.
2. 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.

3.12 INSTALLATION OF POLYOLEFIN INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Seal split-tube longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. 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 polyolefin sheet insulation of same thickness as 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.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of polyolefin 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.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install cut sections of polyolefin pipe and sheet insulation to valve body.
2. 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.

3.13 INSTALLATION OF POLYSTYRENE INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation with tape or bands and tighten bands without deforming insulation materials. Orient longitudinal joints between half sections in 3- and 9-o'clock positions on the pipe.
2. For insulation with factory-applied jackets with vapor barriers, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive or tape as recommended by insulation material manufacturer and seal with vapor-barrier mastic.
3. All insulation shall be tightly butted and free of voids and gaps at all joints. Vapor barrier must be continuous. Before installing jacket material, install vapor-barrier system.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, and make thickness same as adjacent pipe insulation, not to exceed 1-1/2-inch (38-mm).
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polystyrene block insulation of same thickness as pipe insulation.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed section of polystyrene insulation to valve body.
2. 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.

3.14 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 (50-mm) overlap at seams and joints.
2. Embed glass cloth between two 0.062-inch- (1.6-mm-) thick coats of lagging adhesive.
3. Completely encapsulate insulation with coating, leaving no exposed insulation.

B. 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 (38-mm) laps at longitudinal seams and 3-inch- (75-mm-) wide joint strips at end joints.
 5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.
- C. Where PVC jackets are indicated, install with 1-inch (25-mm) 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.
- D. Where metal jackets are indicated, install with 2-inch (50-mm) 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 (300 mm) o.c. and at end joints.
- E. Where PVDC jackets are indicated, install as follows:
1. Apply three separate wraps of filament tape per insulation section to secure pipe insulation to pipe prior to installation of PVDC jacket.
 2. Wrap factory-presizes jackets around individual pipe insulation sections with one end overlapping the previously installed sheet. Install presized jacket with an approximate overlap at butt joint of 2 inches (50 mm) over the previous section. Adhere lap seal using adhesive or SSL, and then apply 1-1/4 circumferences of appropriate PVDC tape around overlapped butt joint.
 3. Continuous jacket can be spiral-wrapped around a length of pipe insulation. Apply adhesive or PVDC tape at overlapped spiral edge. When electing to use adhesives, refer to manufacturer's written instructions for application of adhesives along this spiral edge to maintain a permanent bond.
 4. Jacket can be wrapped in cigarette fashion along length of roll for insulation systems with an outer circumference of 33-1/2 inches (850 mm) or less. The 33-1/2-inch- (850-mm-) circumference limit allows for 2-inch- (50-mm-) overlap seal. Using the length of roll allows for longer sections of jacket to be installed at one time. Use adhesive on the lap seal. Visually inspect lap seal for "fishmouthing," and use PVDC tape along lap seal to secure joint.
 5. Repair holes or tears in PVDC jacket by placing PVDC tape over the hole or tear and wrapping a minimum of 1-1/4 circumferences to avoid damage to tape edges.

3.15 FINISHES

- A. Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 09 painting Sections.
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. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.
 - D. Do not field paint aluminum or stainless-steel jackets.
- 3.16 FIELD QUALITY CONTROL
- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
 - B. Perform tests and inspections.
 - C. Tests and Inspections:
 - 1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.
 - D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.
- 3.17 PIPING INSULATION SCHEDULE, GENERAL
- A. 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.
 - B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 - 1. Drainage piping located in crawl spaces.
 - 2. Underground piping.
 - 3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.
- 3.18 INDOOR PIPING INSULATION SCHEDULE
- A. Condensate and Equipment Drain Water below 60 Deg F (16 Deg C):

1. All Pipe Sizes: Insulation shall be one of the following:
 - a. Cellular Glass: 1-1/2 inches (38 mm) thick.
 - b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (25 mm) thick.
 - B. Heating-Hot-Water Supply and Return, 200 Deg F (93 Deg C) and Below:
 1. NPS 12 (DN 300) and Smaller: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe, Type I: 2 inches (50 mm) thick.
 - C. Refrigerant Suction and Hot-Gas Piping:
 1. All Pipe Sizes: Insulation shall be the following:
 - a. Flexible Elastomeric: 1 inch (25 mm) thick.
 - D. Refrigerant Suction and Hot-Gas Flexible Tubing:
 1. All Pipe Sizes: Insulation shall be the following:
 - a. Flexible Elastomeric: 1 inch (25 mm) thick.
- 3.19 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE
- A. Heating-Hot-Water Supply and Return, 200 Deg F (93 Deg C) and Below:
 1. All Pipe Sizes: Insulation shall be the following:
 - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 2 inches (50 mm) thick.
 - B. Refrigerant Suction and Hot-Gas Piping:
 1. All Pipe Sizes: Insulation shall be the following:
 - a. Flexible Elastomeric: 2 inches (50 mm) thick.
 - C. Refrigerant Suction and Hot-Gas Flexible Tubing:
 1. All Pipe Sizes: Insulation shall be the following:
 - a. Flexible Elastomeric: 2 inches (50 mm) thick.
- 3.20 INDOOR/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. Piping, Concealed:
 - 1. Aluminum, Smooth 0.032 inch (0.81 mm) thick.
- D. Piping, Exposed:
 - 1. Stainless Steel, Type 304 Smooth 2B Finish Embossed: 0.024 inch (0.61 mm) thick.

END OF SECTION 230719

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 230850

TESTING, ADJUSTING, AND BALANCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes TAB to produce design objectives for the following:
 - 1. Air Systems:
 - 2. Hydronic Piping Systems
 - 3. HVAC equipment quantitative-performance settings.
 - 4. Kitchen hood airflow balancing.
 - 5. Vibration measuring.
 - 6. Sound level measuring.
 - 7. Verifying that automatic control devices are functioning properly.
 - 8. Reporting results of activities and procedures specified in this Section.

1.3 DEFINITIONS

- A. Adjust: To regulate fluid flow rate and air patterns at the terminal equipment, such as to reduce fan speed or adjust a damper.
- B. Balance: To proportion flows within the distribution system, including submains, branches, and terminals, according to indicated quantities.
- C. Barrier or Boundary: Construction, either vertical or horizontal, such as walls, floors, and ceilings that are designed and constructed to restrict the movement of airflow, smoke, odors, and other pollutants.
- D. Draft: A current of air, when referring to localized effect caused by one or more factors of high air velocity, low ambient temperature, or direction of airflow, whereby more heat is withdrawn from a person's skin than is normally dissipated.
- E. NC: Noise criteria.
- F. Procedure: An approach to and execution of a sequence of work operations to yield repeatable results.

- G. Report Forms: Test data sheets for recording test data in logical order.
- H. Static Head: The pressure due to the weight of the fluid above the point of measurement. In a closed system, static head is equal on both sides of the pump.
- I. Suction Head: The height of fluid surface above the centerline of the pump on the suction side.
- J. System Effect: A phenomenon that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
- K. System Effect Factors: Allowances used to calculate a reduction of the performance ratings of a fan when installed under conditions different from those presented when the fan was performance tested.
- L. TAB: Testing, adjusting, and balancing.
- M. Terminal: A point where the controlled medium, such as fluid or energy, enters or leaves the distribution system.
- N. Testing, Adjusting, and Balancing (TAB) Firm: The entity responsible for performing and reporting TAB procedures.

1.4 SUBMITTALS

- A. Qualification Data: Within 30 days from Contractor's Notice to Proceed, submit 6 copies of evidence that TAB firm and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.
- B. Contract Documents Examination Report: Within 30 days from Contractor's Notice to Proceed, submit 6 copies of the Contract Documents review report as specified in Part 3.
- C. Strategies and Procedures Plan: Within 30 days from Contractor's Notice to Proceed, submit 6 of TAB strategies and step-by-step procedures as specified in Part 3 "Preparation" Article. Include a complete set of report forms intended for use on this Project.
- D. Certified TAB Reports: Submit two copies of reports prepared, as specified in this Section, on approved forms certified by TAB firm.
- E. Sample Report Forms: Submit two sets of sample TAB report forms.
- F. Warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A. TAB Firm Qualifications: Engage a TAB firm certified by either AABC or NEBB.
- B. TAB Conference: Meet with City of New York's and Commissioner's representatives on approval of TAB strategies and procedures plan to develop a mutual understanding of the

details. Ensure the participation of TAB team members, equipment manufacturers' authorized service representatives, HVAC controls installers, and other support personnel. Provide seven days' advance notice of scheduled meeting time and location.

1. Agenda Items: Include at least the following:
 - a. Submittal distribution requirements.
 - b. The Contract Documents examination report.
 - c. TAB plan.
 - d. Work schedule and Project-site access requirements.
 - e. Coordination and cooperation of trades and subcontractors.
 - f. Coordination of documentation and communication flow.
 - C. Certification of TAB Reports: Certify TAB field data reports. This certification includes the following:
 1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
 2. Certify that TAB team complied with approved TAB plan and the procedures specified and referenced in this Specification.
 - D. TAB Report Forms: Use standard forms from AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems." NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems." SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing."
 - E. Instrumentation Type, Quantity, and Accuracy: As described in AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems, NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems," Section II, "Required Instrumentation for NEBB Certification."
 - F. Instrumentation Calibration: Calibrate instruments at least every six months or more frequently if required by instrument manufacturer. Keep an updated record of instrument calibration that indicates date of calibration and the name of party performing instrument calibration.
- 1.6 PROJECT CONDITIONS
- A. Full City of New York Occupancy: City of New York will occupy the site and existing building during entire TAB period. Cooperate with City of New York during TAB operations to minimize conflicts with City of New York's operations.
- 1.7 COORDINATION
- A. Coordinate the efforts of factory-authorized service representatives for systems and equipment, HVAC controls installers, and other mechanics to operate HVAC systems and equipment to support and assist TAB activities.

- B. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.
- C. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

1.8 WARRANTY

- A. National Project Performance Guarantee: Provide a guarantee on AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems" forms stating that AABC will assist in completing requirements of the Contract Documents if TAB firm fails to comply with the Contract Documents. Guarantee includes the following provisions:
- B. Special Guarantee: Provide a guarantee on NEBB forms stating that NEBB will assist in completing requirements of the Contract Documents if TAB firm fails to comply with the Contract Documents. Guarantee shall include the following provisions:
 - 1. The certified TAB firm has tested and balanced systems according to the Contract Documents.
 - 2. Systems are balanced to optimum performance capabilities within design and installation limits.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine the Contract Documents and Project Record Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
 - 1. Contract Documents are defined in the General and Supplementary Conditions of Contract.
 - 2. Verify that balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are required by the Contract Documents. Verify that quantities and locations of these balancing devices are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- B. Examine approved submittal data of HVAC systems and equipment.
- C. 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.

- D. Examine equipment performance data including fan and pump curves. 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. Calculate system effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from those presented when the equipment was performance tested at the factory. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," Sections 7 through 10; or in SMACNA's "HVAC Systems--Duct Design," Sections 5 and 6. Compare this data with the design data and installed conditions.
- E. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Sections have been performed.
- F. Examine HVAC system and equipment installations to verify that indicated balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers, are properly installed, and that their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- G. Examine systems for functional deficiencies that cannot be corrected by adjusting and balancing.
- H. Examine HVAC equipment to ensure that clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- I. Examine variable-air-volume boxes, to verify that they are accessible and their controls are connected and functioning.
- J. Examine plenum ceilings used for supply air to verify that they are airtight. Verify that pipe penetrations and other holes are sealed.
- K. Examine strainers for clean screens and proper perforations.
- L. Examine three-way valves for proper installation for their intended function of diverting or mixing fluid flows.
- M. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- N. Examine system pumps to ensure absence of entrained air in the suction piping.
- O. Examine equipment for installation and for properly operating safety interlocks and controls.
- P. Examine automatic temperature system components to verify the following:
 - 1. Dampers, valves, and other controlled devices are operated by the intended controller.
 - 2. Dampers and valves are in the position indicated by the controller.
 - 3. Integrity of valves and dampers for free and full operation and for tightness of fully closed and fully open positions.
 - 4. Automatic modulating and shutoff valves, including two-way valves and three-way mixing and diverting valves, are properly connected.

5. Thermostats are located to avoid adverse effects of sunlight, drafts, and cold walls.
 6. Sensors are located to sense only the intended conditions.
 7. Sequence of operation for control modes is according to the Contract Documents.
 8. Controller set points are set at indicated values.
 9. Interlocked systems are operating.
 10. Changeover from heating to cooling mode occurs according to indicated values.
- Q. 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.

3.2 PREPARATION

- A. Prepare a TAB plan that includes strategies and step-by-step procedures.
- B. Complete system readiness checks and prepare system readiness reports. Verify the following:
1. Permanent electrical power wiring is complete.
 2. Hydronic systems are filled, clean, and free of air.
 3. Automatic temperature-control systems are operational.
 4. Equipment and duct access doors are securely closed.
 5. Balance, smoke, and fire dampers are open.
 6. Isolating and balancing valves are open and control valves are operational.
 7. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
 8. Windows and doors can be closed so indicated conditions for system operations can be met.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Testing and Balancing Heating, Ventilating, and Air Conditioning Systems", NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems", SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and this Section.
- B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to insulation Specifications for this Project.
- C. Mark equipment and balancing device settings with paint or other suitable, permanent identification material, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck 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 outside-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. Check for proper sealing of air duct system.

3.5 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 fan static pressures to determine actual static pressure as follows:
 - a. Measure outlet static pressure as far downstream from the fan as practicable and upstream from restrictions in ducts such as elbows and transitions.
 - b. Measure static pressure directly at the fan outlet or through the flexible connection.
 - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from flexible connection and downstream from duct restrictions.
 - d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
 - 2. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment. Simulate dirty filter operation and record the point at which maintenance personnel must change filters.
 - 3. Measure static pressures entering and leaving other devices such as sound traps, heat recovery equipment, and air washers, under final balanced conditions.

4. Compare design data with installed conditions to determine variations in design static pressures versus actual static pressures. Compare actual system effect factors with calculated system effect factors to identify where variations occur. Recommend corrective action to align design and actual conditions.
 5. Obtain approval from Commissioner for adjustment of fan speed higher or lower than indicated speed. Make required adjustments to pulley sizes, motor sizes, and electrical connections to accommodate fan-speed changes.
 6. 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 will occur. Measure amperage in full cooling, full heating, economizer, and any other operating modes to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
1. Measure static pressure at a point downstream from the balancing damper and adjust volume dampers until the proper static pressure is achieved.
 2. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.
- C. Measure terminal outlets and inlets without making adjustments. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.
- D. Adjust terminal outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using volume dampers rather than extractors and the dampers at air terminals.
1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
 2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.6 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

- A. **Compensating for Diversity:** When the total airflow of all terminal units is more than the indicated airflow of the fan, place a selected number of terminal units at a maximum set-point airflow condition until the total airflow of the terminal units equals the indicated airflow of the fan. Select the reduced airflow terminal units so they are distributed evenly among the branch ducts.
- B. **Pressure-Dependent, Variable-Air-Volume Systems without Diversity:** After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:
1. Balance systems similar to constant-volume air systems.
 2. Set terminal units and supply fan at full-airflow condition.

3. Adjust inlet dampers of each terminal unit to indicated airflow and verify operation of the static-pressure controller. When total airflow is correct, balance the air outlets downstream from terminal units as described for constant-volume air systems.
4. Readjust fan airflow for final maximum readings.
5. Measure operating static pressure at the sensor that controls the supply fan, if one is installed, and verify operation of the static-pressure controller.
6. Set supply fan at minimum airflow if minimum airflow is indicated. Measure static pressure to verify that it is being maintained by the controller.
7. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow as described for constant-volume air systems.
8. Measure the return airflow to the fan while operating at maximum return airflow and minimum outside airflow. Adjust the fan and balance the return-air ducts and inlets as described for constant-volume air systems.

3.7 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

- A. Prepare test reports with pertinent design data and number in sequence starting at pump to end of system. Check the sum of branch-circuit flows against approved pump flow rate. Correct variations that exceed plus or minus 5 percent.
- B. Prepare schematic diagrams of systems' "as-built" piping layouts.
- C. Prepare hydronic systems for testing and balancing according to the following, in addition to the general preparation procedures specified above:
 1. Open all manual valves for maximum flow.
 2. Check expansion tank liquid level.
 3. Check makeup-water-station pressure gage for adequate pressure for highest vent.
 4. Check flow-control valves for specified sequence of operation and set at indicated flow.
 5. Set differential-pressure control valves at the specified differential pressure. Do not set at fully closed position when pump is positive-displacement type unless several terminal valves are kept open.
 6. Set system controls so automatic valves are wide open to heat exchangers.
 7. Check pump-motor load. If motor is overloaded, throttle main flow-balancing device so motor nameplate rating is not exceeded.
 8. Check air vents for a forceful liquid flow exiting from vents when manually operated.

3.8 PROCEDURES FOR HYDRONIC SYSTEMS

- A. Measure water flow at pumps. Use the following procedures, except for positive-displacement pumps:
 1. Verify impeller size by operating the pump with the discharge valve closed. Read pressure differential across the pump. Convert pressure to head and correct for differences in gage heights. Note the point on manufacturer's pump curve at zero flow and verify that the pump has the intended impeller size.

2. Check system resistance. With all valves open, read pressure differential across the pump and mark pump manufacturer's head-capacity curve. Adjust pump discharge valve until indicated water flow is achieved.
 3. Verify pump-motor brake horsepower. Calculate the intended brake horsepower for the system based on pump manufacturer's performance data. Compare calculated brake horsepower with nameplate data on the pump motor. Report conditions where actual amperage exceeds motor nameplate amperage.
 4. Report flow rates that are not within plus or minus 5 percent of design.
- B. Set calibrated balancing valves, if installed, at calculated presettings.
- C. Measure flow at all stations and adjust, where necessary, to obtain first balance. System components that have Cv rating or an accurately cataloged flow-pressure-drop relationship may be used as a flow-indicating device.
- D. Measure flow at main balancing station and set main balancing device to achieve flow that is 5 percent greater than indicated flow.
- E. Adjust balancing stations to within specified tolerances of indicated flow rate as follows:
1. Determine the balancing station with the highest percentage over indicated flow.
 2. Adjust each station in turn, beginning with the station with the highest percentage over indicated flow and proceeding to the station with the lowest percentage over indicated flow.
 3. Record settings and mark balancing devices.
- F. Measure pump flow rate and make final measurements of pump amperage, voltage, rpm, pump heads, and systems' pressures and temperatures including outdoor-air temperature.
- G. Measure the differential-pressure control valve settings existing at the conclusions of balancing.

3.9 PROCEDURES FOR MOTORS

- A. Motors: Test at final balanced conditions and record the following data:
1. Manufacturer, model, and serial numbers.
 2. Motor horsepower rating.
 3. Motor rpm.
 4. Efficiency rating.
 5. Nameplate and measured voltage, each phase.
 6. Nameplate and measured amperage, each phase.
 7. Starter thermal-protection-element rating.

3.10 PROCEDURES FOR BOILERS

- A. If hydronic, measure entering- and leaving-water temperatures and water flow.

3.11 PROCEDURES FOR HEAT-TRANSFER COILS

- A. Water Coils: Measure the following data for each coil:
1. Entering- and leaving-water temperature.
 2. Water flow rate.
 3. Water pressure drop.
 4. Dry-bulb temperature of entering and leaving air.
 5. Wet-bulb temperature of entering and leaving air for cooling coils.
 6. Airflow.
 7. Air pressure drop.
- B. Electric-Heating Coils: Measure the following data for each coil:
1. Nameplate data.
 2. Airflow.
 3. Entering- and leaving-air temperature at full load.
 4. Voltage and amperage input of each phase at full load and at each incremental stage.
 5. Calculated kilowatt at full load.
 6. Fuse or circuit-breaker rating for overload protection.
- C. Refrigerant Coils: Measure the following data for each coil:
1. Dry-bulb temperature of entering and leaving air.
 2. Wet-bulb temperature of entering and leaving air.
 3. Airflow.
 4. Air pressure drop.
 5. Refrigerant suction pressure and temperature.

3.12 PROCEDURES FOR TEMPERATURE MEASUREMENTS

- A. During TAB, report the need for adjustment in temperature regulation within the automatic temperature-control system.
- B. Measure indoor wet- and dry-bulb temperatures every other hour for a period of two successive eight-hour days, in each separately controlled zone, to prove correctness of final temperature settings. Measure when the building or zone is occupied.
- C. Measure outside-air, wet- and dry-bulb temperatures.

3.13 PROCEDURES FOR COMMERCIAL KITCHEN HOODS

- A. Measure, adjust, and record the airflow of each kitchen hood. For kitchen hoods designed with integral makeup air, measure and adjust the exhaust and makeup airflow. Measure airflow by duct Pitot-tube traverse. If a duct Pitot-tube traverse is not possible, provide an explanation in the report of the reason(s) why and also the reason why the method used was chosen.
1. Install welded test ports in the sides of the exhaust duct for the duct Pitot-tube traverse. Install each test port with a threaded cap that is liquid tight.

B. After balancing is complete, do the following:

1. Measure and record the static pressure at the hood exhaust-duct connection.
2. Measure and record the hood face velocity. Make measurements at multiple points across the face of the hood. Perform measurements at a maximum of 12 inches (300 mm) between points and between any point and the perimeter. Calculate the average of the measurements recorded. Verify that the hood average face velocity complies with the Contract Documents and governing codes.
3. Check the hood for capture and containment of smoke using a smoke emitting device. Observe the smoke pattern. Make adjustments to room airflow patterns to achieve optimum results.

C. Visually inspect the hood exhaust duct throughout its entire length in compliance with authorities having jurisdiction. Begin at the hood connection and end at the point it discharges outdoors. Report findings.

1. Check duct slopes as required.
2. Verify that duct access is installed as required.
3. Verify that point of termination is as required.
4. Verify that duct air velocity is within the range required.
5. Verify that duct is within a fire-rated enclosure.

D. Report deficiencies.

3.14 PROCEDURES FOR VIBRATION MEASUREMENTS

A. Use a vibration meter meeting the following criteria:

1. Solid-state circuitry with a piezoelectric accelerometer.
2. Velocity range of 0.1 to 10 inches per second (2.5 to 254 mm/s).
3. Displacement range of 1 to 100 mils (0.0254 to 2.54 mm).
4. Frequency range of at least 0 to 1000 Hz.
5. Capable of filtering unwanted frequencies.

B. Calibrate the vibration meter before each day of testing.

1. Use a calibrator provided with the vibration meter.
2. Follow vibration meter and calibrator manufacturer's calibration procedures.

C. Perform vibration measurements when other building and outdoor vibration sources are at a minimum level and will not influence measurements of equipment being tested.

1. Turn off equipment in the building that might interfere with testing.
2. Clear the space of people.

D. Perform vibration measurements after air and water balancing and equipment testing is complete.

E. Clean equipment surfaces in contact with the vibration transducer.

- F. Position the vibration transducer according to manufacturer's written instructions and to avoid interference with the operation of the equipment being tested.
- G. Measure and record vibration on rotating equipment over 2 hp.
- H. Measure and record equipment vibration, bearing vibration, equipment base vibration, and building structure vibration. Record velocity and displacement readings in the horizontal, vertical, and axial planes.
 - 1. Pumps:
 - a. Pump Bearing: Drive end and opposite end.
 - b. Motor Bearing: Drive end and opposite end.
 - c. Pump Base: Top and side.
 - d. Building: Floor.
 - e. Piping: To and from the pump after flexible connections.
 - 2. Fans and HVAC Equipment with Fans:
 - a. Fan Bearing: Drive end and opposite end.
 - b. Motor Bearing: Drive end and opposite end.
 - c. Equipment Casing: Top and side.
 - d. Equipment Base: Top and side.
 - e. Building: Floor.
 - f. Ductwork: To and from equipment after flexible connections.
 - g. Piping: To and from equipment after flexible connections.
 - 3. HVAC Equipment with Compressors:
 - a. Compressor Bearing: Drive end and opposite end.
 - b. Motor Bearing: Drive end and opposite end.
 - c. Equipment Casing: Top and side.
 - d. Equipment Base: Top and side.
 - e. Building: Floor.
 - f. Piping: To and from equipment after flexible connections.
- I. For equipment with vibration isolation, take floor measurements with the vibration isolation blocked solid to the floor and with the vibration isolation floating. Calculate and report the differences.
- J. Inspect, measure, and record vibration isolation.
 - 1. Verify that vibration isolation is installed in the required locations.
 - 2. Verify that installation is level and plumb.
 - 3. Verify that isolators are properly anchored.
 - 4. For spring isolators, measure the compressed spring height, the spring OD, and the travel-to-solid distance.

5. Measure the operating clearance between each inertia base and the floor or concrete base below. Verify that there is unobstructed clearance between the bottom of the inertia base and the floor.

3.15 TEMPERATURE-CONTROL VERIFICATION

- A. Verify that controllers are calibrated and commissioned.
- B. Check transmitter and controller locations and note conditions that would adversely affect control functions.
- C. Record controller settings and note variances between set points and actual measurements.
- D. Check the operation of limiting controllers (i.e., high- and low-temperature controllers).
- E. Check free travel and proper operation of control devices such as damper and valve operators.
- F. Check the sequence of operation of control devices. Note air pressures and device positions and correlate with airflow and water flow measurements. Note the speed of response to input changes.
- G. Check the interaction of electrically operated switch transducers.
- H. Check the interaction of interlock and lockout systems.
- I. Record voltages of power supply and controller output. Determine whether the system operates on a grounded or nongrounded power supply.
- J. Note operation of electric actuators using spring return for proper fail-safe operations.

3.16 TOLERANCES

- A. Set HVAC system airflow and water flow rates within the following tolerances:
 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus 5 percent.
 2. Air Outlets and Inlets: 0 to minus 5 percent.
 3. Heating-Water Flow Rate: 0 to minus 5 percent.

3.17 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.

- B. Status Reports: As Work progresses, prepare 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.

3.18 FINAL REPORT

- A. General: Typewritten, or computer printout in letter-quality font, on standard bond paper, in three-ring binder, tabulated and divided into sections by tested and balanced systems.
- B. Include a certification sheet in front of binder signed and sealed by the certified testing and balancing.
 - 1. Include a list of instruments used for procedures, along with proof of calibration.
- C. 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, but do not include Shop Drawings and Product Data.
- D. General Report Data: In addition to form titles and entries, include the following data in the final report, as applicable:
 - 1. Title page.
 - 2. Name and address of TAB firm.
 - 3. Project name.
 - 4. Project location.
 - 5. Commissioner's name and address.
 - 6. Commissioner address.
 - 7. Contractor's name and address.
 - 8. Report date.
 - 9. Signature of TAB firm 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.
 - 12. Nomenclature sheets for each item of equipment.
 - 13. Data for terminal units, including manufacturer, type size, and fittings.
 - 14. Notes to explain why certain final data in the body of reports varies from indicated values.
 - 15. Test conditions for fans and pump performance forms including the following:
 - a. Settings for outside-, 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.
- E. 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 outside, supply, return, and exhaust airflows.
 - 2. Water flow rates.
 - 3. Duct, outlet, and inlet sizes.
 - 4. Pipe and valve sizes and locations.
 - 5. Terminal units.
 - 6. Balancing stations.
 - 7. Position of balancing devices.
- F. Air-Handling Unit Test Reports: For air-handling units with coils, include the following:
- 1. Unit Data: Include the following:
 - 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 (mm), and bore.
 - i. Sheave dimensions, center-to-center, and amount of adjustments in inches (mm).
 - j. Number of belts, make, and size.
 - k. Number of filters, type, and size.
 - 2. Motor Data:
 - a. 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 (mm), and bore.
 - f. Sheave dimensions, center-to-center, and amount of adjustments in inches (mm).
 - 3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm (L/s).
 - b. Total system static pressure in inches wg (Pa).
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg (Pa).
 - e. Filter static-pressure differential in inches wg (Pa).

- f. Cooling coil static-pressure differential in inches wg (Pa).
- g. Outside airflow in cfm (L/s).
- h. Return airflow in cfm (L/s).
- i. Outside-air damper position.
- j. Return-air damper position.

G. Apparatus-Coil Test Reports:

1. Coil Data:

- a. System identification.
- b. Location.
- c. Coil type.
- d. Number of rows.
- e. Fin spacing in fins per inch (mm) o.c.
- f. Make and model number.
- g. Face area in sq. ft. (sq. m).
- h. Tube size in NPS (DN).
- i. Tube and fin materials.
- j. Circuiting arrangement.

2. Test Data (Indicated and Actual Values):

- a. Airflow rate in cfm (L/s).
- b. Average face velocity in fpm (m/s).
- c. Air pressure drop in inches wg (Pa).
- d. Entering-air, wet- and dry-bulb temperatures in deg F (deg C).
- e. Leaving-air, wet- and dry-bulb temperatures in deg F (deg C).
- f. Water flow rate in gpm (L/s).
- g. Water pressure differential in feet of head or psig (kPa).
- h. Entering-water temperature in deg F (deg C).
- i. Leaving-water temperature in deg F (deg C).
- j. Refrigerant expansion valve and refrigerant types.
- k. Refrigerant suction pressure in psig (kPa).
- l. Refrigerant suction temperature in deg F (deg C).

H. Gas-Fired Heat Apparatus 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 Btuh (kW).
- h. Ignition type.

- i. Burner-control types.
- j. Motor horsepower and rpm.
- k. Motor volts, phase, and hertz.
- l. Motor full-load amperage and service factor.
- m. Sheave make, size in inches (mm), and bore.
- n. Sheave dimensions, center-to-center, and amount of adjustments in inches (mm).

2. Test Data (Indicated and Actual Values):

- a. Total airflow rate in cfm (L/s).
- b. Entering-air temperature in deg F (deg C).
- c. Leaving-air temperature in deg F (deg C).
- d. Air temperature differential in deg F (deg C).
- e. Entering-air static pressure in inches wg (Pa).
- f. Leaving-air static pressure in inches wg (Pa).
- g. Air static-pressure differential in inches wg (Pa).
- h. Low-fire fuel input in Btuh (kW).
- i. High-fire fuel input in Btuh (kW).
- j. Manifold pressure in psig (kPa).
- k. High-temperature-limit setting in deg F (deg C).
- l. Operating set point in Btuh (kW).
- m. Motor voltage at each connection.
- n. Motor amperage for each phase.
- o. Heating value of fuel in Btuh (kW).

I. 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 Btuh (kW).
- e. Number of stages.
- f. Connected volts, phase, and hertz.
- g. Rated amperage.
- h. Airflow rate in cfm (L/s).
- i. Face area in sq. ft. (sq. m).
- j. Minimum face velocity in fpm (m/s).

2. Test Data (Indicated and Actual Values):

- a. Heat output in Btuh (kW).
- b. Airflow rate in cfm (L/s).
- c. Air velocity in fpm (m/s).
- d. Entering-air temperature in deg F (deg C).
- e. Leaving-air temperature in deg F (deg C).
- f. Voltage at each connection.

- g. Amperage for each phase.
- J. 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 (mm), and bore.
 - h. Sheave dimensions, center-to-center, and amount of adjustments in inches (mm).
 - 2. Motor Data:
 - a. 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 (mm), and bore.
 - f. Sheave dimensions, center-to-center, and amount of adjustments in inches (mm).
 - g. Number of belts, make, and size.
 - 3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm (L/s).
 - b. Total system static pressure in inches wg (Pa).
 - c. Fan rpm.
 - d. Discharge static pressure in inches wg (Pa).
 - e. Suction static pressure in inches wg (Pa).
- K. 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 (deg C).
 - d. Duct static pressure in inches wg (Pa).
 - e. Duct size in inches (mm).
 - f. Duct area in sq. ft. (sq. m).
 - g. Indicated airflow rate in cfm (L/s).
 - h. Indicated velocity in fpm (m/s).
 - i. Actual airflow rate in cfm (L/s).
 - j. Actual average velocity in fpm (m/s).
 - k. Barometric pressure in psig (Pa).

L. Air-Terminal-Device Reports:

1. Unit Data:

- a. System and air-handling unit identification.
- b. Location and zone.
- c. Test apparatus used.
- d. Area served.
- e. Air-terminal-device make.
- f. Air-terminal-device number from system diagram.
- g. Air-terminal-device type and model number.
- h. Air-terminal-device size.
- i. Air-terminal-device effective area in sq. ft. (sq. m).

2. Test Data (Indicated and Actual Values):

- a. Airflow rate in cfm (L/s).
- b. Air velocity in fpm (m/s).
- c. Preliminary airflow rate as needed in cfm (L/s).
- d. Preliminary velocity as needed in fpm (m/s).
- e. Final airflow rate in cfm (L/s).
- f. Final velocity in fpm (m/s).
- g. Space temperature in deg F (deg C).

M. System-Coil Reports: For reheat coils and water coils of terminal units, include the following:

1. Unit Data:

- a. System and air-handling unit identification.
- b. Location and zone.
- c. Room or riser served.
- d. Coil make and size.
- e. Flowmeter type.

2. Test Data (Indicated and Actual Values):

- a. Airflow rate in cfm (L/s).
- b. Entering-water temperature in deg F (deg C).
- c. Leaving-water temperature in deg F (deg C).
- d. Water pressure drop in feet of head or psig (kPa).
- e. Entering-air temperature in deg F (deg C).
- f. Leaving-air temperature in deg F (deg C).

N. Compressor and Condenser Reports: For refrigerant side of unitary systems, stand-alone refrigerant compressors, or air-cooled condensing units, include the following:

1. Unit Data:

- a. Unit identification.

- b. Location.
- c. Unit make and model number.
- d. Compressor make.
- e. Compressor model and serial numbers.
- f. Refrigerant weight in lb (kg).
- g. Low ambient temperature cutoff in deg F (deg C).

2. Test Data (Indicated and Actual Values):

- a. Inlet-duct static pressure in inches wg (Pa).
- b. Outlet-duct static pressure in inches wg (Pa).
- c. Entering-air, dry-bulb temperature in deg F (deg C).
- d. Leaving-air, dry-bulb temperature in deg F (deg C).
- e. Control settings.
- f. Unloader set points.
- g. Low-pressure-cutout set point in psig (kPa).
- h. High-pressure-cutout set point in psig (kPa).
- i. Suction pressure in psig (kPa).
- j. Suction temperature in deg F (deg C).
- k. Condenser refrigerant pressure in psig (kPa).
- l. Condenser refrigerant temperature in deg F (deg C).
- m. Oil pressure in psig (kPa).
- n. Oil temperature in deg F (deg C).
- o. Voltage at each connection.
- p. Amperage for each phase.
- q. Kilowatt input.
- r. Crankcase heater kilowatt.
- s. Number of fans.
- t. Condenser fan rpm.
- u. Condenser fan airflow rate in cfm (L/s).
- v. Condenser fan motor make, frame size, rpm, and horsepower.
- w. Condenser fan motor voltage at each connection.
- x. Condenser fan motor amperage for each phase.

O. 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 and serial numbers.
- f. Water flow rate in gpm (L/s).
- g. Water pressure differential in feet of head or psig (kPa).
- h. Required net positive suction head in feet of head or psig (kPa).
- i. Pump rpm.
- j. Impeller diameter in inches (mm).

- 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 (kPa).
- b. Pump shutoff pressure in feet of head or psig (kPa).
- c. Actual impeller size in inches (mm).
- d. Full-open flow rate in gpm (L/s).
- e. Full-open pressure in feet of head or psig (kPa).
- f. Final discharge pressure in feet of head or psig (kPa).
- g. Final suction pressure in feet of head or psig (kPa).
- h. Final total pressure in feet of head or psig (kPa).
- i. Final water flow rate in gpm (L/s).
- j. Voltage at each connection.
- k. Amperage for each phase.

P. Boiler Test Reports:

1. Unit Data:

- a. Unit identification.
- b. Location.
- c. Service.
- d. Make and type.
- e. Model and serial numbers.
- f. Fuel type and input in Btuh (kW).
- g. Number of passes.
- h. Ignition type.
- i. Burner-control types.
- j. Voltage at each connection.
- k. Amperage for each phase.

2. Test Data (Indicated and Actual Values):

- a. Operating pressure in psig (kPa).
- b. Operating temperature in deg F (deg C).
- c. Entering-water temperature in deg F (deg C).
- d. Leaving-water temperature in deg F (deg C).
- e. Number of safety valves and sizes in NPS (DN).
- f. Safety valve settings in psig (kPa).
- g. High-limit setting in psig (kPa).
- h. Operating-control setting.
- i. High-fire set point.
- j. Low-fire set point.

- k. Voltage at each connection.
- l. Amperage for each phase.
- m. Draft fan voltage at each connection.
- n. Draft fan amperage for each phase.
- o. Manifold pressure in psig (kPa).

Q. Vibration Measurement Reports:

- 1. Date and time of test.
- 2. Vibration meter manufacturer, model number, and serial number.
- 3. Equipment designation, location, equipment, speed, motor speed, and motor horsepower.
- 4. Diagram of equipment showing the vibration measurement locations.
- 5. Measurement readings for each measurement location.
- 6. Calculate isolator efficiency using measurements taken.
- 7. Description of predominant vibration source.

R. Instrument Calibration Reports:

- 1. Report Data:
 - a. Instrument type and make.
 - b. Serial number.
 - c. Application.
 - d. Dates of use.
 - e. Dates of calibration.

3.19 INSPECTIONS

A. Initial Inspection:

- 1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the Final Report.
- 2. Randomly check the following for each system:
 - a. Measure airflow of at least 10 percent of air outlets.
 - b. Measure water flow of at least 5 percent of terminals.
 - c. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
 - d. Measure sound levels at two locations.
 - e. Measure space pressure of at least 10 percent of locations.
 - f. Verify that balancing devices are marked with final balance position.
 - g. Note deviations to the Contract Documents in the Final Report.

B. Final Inspection:

- 1. After initial inspection is complete and evidence by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by the Commissioner.

2. TAB firm test and balance shall conduct the inspection in the presence of City of New York.
3. Commissioner shall randomly select measurements documented in the final report to be rechecked. The rechecking shall 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.
4. If the rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
6. TAB firm shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes and resubmit the final report.
7. Request a second final inspection. If the second final inspection also fails, City of New York shall contract the services of another TAB firm to complete the testing and balancing in accordance with the Contract Documents and deduct the cost of the services from the final payment.

3.20 ADDITIONAL TESTS

- A. Within 90 days of completing TAB, perform additional testing and balancing 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 testing, inspecting, and adjusting during near-peak summer and winter conditions.

END OF SECTION 23 08 50

SECTION 230900

HVAC INSTRUMENTATION AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes control equipment for HVAC systems and components, including control components for terminal heating and cooling units not supplied with factory-wired controls.
- B. Related Sections include the following:
 - 1. Section "Meters and Gages" for measuring equipment that relates to this Section.

1.3 DEFINITIONS

- A. I/O: Input/output.
- B. RTD: Resistance temperature detector.

1.4 SYSTEM PERFORMANCE

- A. Comply with the following performance requirements:
 - 1. Object Command: Reaction time of less than two seconds between operator command of a binary object and device reaction.
 - 2. Alarm Response Time: Annunciate alarm within 45 seconds.
 - 3. Performance: Programmable controllers shall execute control loops, and scan and update process values and outputs at least once per second.
 - 4. Reporting Accuracy and Stability of Control: Report values and maintain measured variables within tolerances as follows:
 - a. Water Temperature: Plus or minus 1 deg F (0.5 deg C).
 - b. Water Flow: Plus or minus 5 percent of full scale.
 - c. Water Pressure: Plus or minus 2 percent of full scale.
 - d. Space Temperature: Plus or minus 1 deg F (0.5 deg C).
 - e. Ducted Air Temperature: Plus or minus 1 deg F (0.5 deg C).

- f. Outside Air Temperature: Plus or minus 2 deg F (1.0 deg C).
- g. Temperature Differential: Plus or minus 0.25 deg F (0.15 deg C).
- h. Airflow (Terminal): Plus or minus 10 percent of full scale.
- i. Air Pressure (Space): Plus or minus 0.01-inch wg (2.5 Pa).
- j. Air Pressure (Ducts): Plus or minus 0.1-inch wg (25 Pa).

1.5 SUBMITTALS

- A. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated.
 - 1. System Hardware: Bill of materials of equipment indicating quantity, manufacturer, and model number. Include technical data for all equipment.
 - 2. Control System Software: Include technical data for operating system software and other applications.
 - 3. Controlled Systems: Instrumentation list with element name, type of device, manufacturer, model number, and product data. Include written description of sequence of operation including schematic diagram.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 1. Bill of materials of equipment indicating quantity, manufacturer, and model number.
 - 2. Schematic flow diagrams showing fans, pumps, coils, dampers, valves, and control devices.
 - 3. Wiring Diagrams: Power, signal, and control wiring.
 - 4. Details of control panel faces, including controls, instruments, and labeling.
 - 5. Written description of sequence of operation.
 - 6. Schedule of dampers including size, leakage, and flow characteristics.
 - 7. Schedule of valves including flow characteristics.
 - 8. System Hardware: Schematic diagrams and floor plans for field sensors and control hardware.
 - 9. Control System Software.
 - 10. Controlled Systems:
 - a. Schematic diagrams of each controlled system with control points labeled and control elements shown, with wiring.
 - b. Scaled drawings showing mounting, routing, and wiring of elements including bases and special construction.
 - c. Written description of sequence of operation including schematic diagram.
 - d. Points list.
- C. Data Communications Protocol Certificates: Certify that compliance with ASHRAE 135.
- D. Samples for Initial Selection: For each color required, of each type of thermostat or sensor cover with factory-applied color finishes.

- E. Samples for Verification: For each color required, of each type of thermostat or sensor cover.
- F. Software Operational Documentation: Include the following: Manuals, Device address list, Software licenses.
- G. Qualification Data: For Installer and manufacturer.
- H. Field quality-control test reports.
- I. Operation and Maintenance Data: For HVAC instrumentation and control system to include in emergency, operation, and maintenance manuals. In addition to items specified in General Conditions Sections.
 - 1. Maintenance instructions and lists of spare parts for each type of control device.
 - 2. Interconnection wiring diagrams.
 - 3. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
 - 4. Calibration records and list of set points.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. The contractor or subcontractor performing the work of this section must, within the last five (5) consecutive years prior to the bid opening, have successfully completed in a timely fashion at least three (3) projects similar in scope and type to the required work.
- B. The manufacturer providing the material or equipment specified in this section must, for the past five (5) years, have been regularly engaged in the manufacture of material or equipment similar in type to that required for this Project. Such similar material or equipment provided by the manufacturer must have been in satisfactory service for not less than five (5) years.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping of control devices to equipment manufacturer.
- B. System Software: Update to latest version of software at Project completion.

1.8 COORDINATION

- A. Coordinate location of thermostats and other exposed control sensors with plans and room details before installation.

1.9 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Replacement Materials: One replacement diaphragm or relay mechanism for each unique valve motor, controller, thermostat and positioning relay.
 - 2. Maintenance Materials: One thermostat adjusting key(s).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 CONTROL SYSTEM

- A. Manufacturers:
 - 1. Honeywell International Inc. Webstat System.
 - 2. Trane; Worldwide Applied Systems Group
 - 3. Heat-Timer Corporation.
 - 4. Invensys Building Systems.
 - 5. Johnson Controls, Inc.; Controls Group.
- B. Control system shall consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, and accessories to control mechanical systems.

2.3 CONTROL EQUIPMENT

- A. Diagnostic Terminal Unit: Portable notebook-style terminal capable of accessing system data.
- B. Control Units: Modular, comprising processor board with programmable, nonvolatile, random-access memory; local operator access and display panel; integral interface equipment; and backup power source.

1. Units monitor or control each I/O point; process information; execute commands from other control units and devices.
 2. Stand-alone mode control functions operate regardless of network status. Functions include the following:
 - a. Global communications.
 - b. Discrete/digital, analog, and pulse I/O.
 - c. Monitoring, controlling, or addressing data points.
 - d. Software applications, scheduling, and alarm processing.
 - e. Testing and developing control algorithms without disrupting field hardware and controlled environment.
 3. Standard Application Programs:
 - a. Electric Control Programs: automatic time scheduling, start/stop time optimization, night setback/setup, on-off control with differential sequencing, and antishort cycling.
 - b. HVAC Control Programs: Optimal run time, supply-air reset, and enthalpy switchover.
 - c. Programming Application Features: Include trend point; alarm processing and messaging; scheduling; run-time totalization; and security access.
 - d. Maintenance management.
 4. ASHRAE 135 Compliance.
- C. Local Control Units: Modular, comprising processor board with electronically programmable, nonvolatile, read-only memory; and backup power source.
1. Units monitor or control each I/O point and process information.
 2. Stand-alone mode control functions operate regardless of network status. Functions include the following:
 - a. Global communications.
 - b. Discrete/digital, analog, and pulse I/O.
 - c. Monitoring, controlling, or addressing data points.
 3. Local operator interface.
 4. ASHRAE 135 Compliance.
- D. I/O Interface: Hardwired inputs and outputs may tie into system through controllers. Protect points so that shorting will cause no damage to controllers.
1. Binary Inputs: Allow monitoring of on-off signals without external power.
 2. Pulse Accumulation Inputs: Accept up to 10 pulses per second.
 3. Analog Inputs: Allow monitoring of low-voltage (0- to 10-V dc), current (4 to 20 mA), or resistance signals.
 4. Binary Outputs: Provide on-off or pulsed low-voltage signal, selectable for normally open or normally closed operation with three-position (on-off-auto) override switches and status lights.

5. Analog Outputs: Provide modulating signal, either low voltage (0- to 10-V dc) or current (4 to 20 mA) with status lights, two-position (auto-manual) switch, and manually adjustable potentiometer.
 6. Tri-State Outputs: Provide two coordinated binary outputs for control of three-point, floating-type electronic actuators.
 7. Universal I/Os: Provide software selectable binary or analog outputs.
- E. Power Supplies: Transformers with Class 2 current-limiting type or overcurrent protection; limit connected loads to 80 percent of rated capacity. DC power supply shall match output current and voltage requirements and be full-wave rectifier type with the following:
1. Built-in overvoltage and overcurrent protection and be able to withstand 150 percent overload for at least 3 seconds without failure.

2.4 UNITARY CONTROLLERS

- A. Unitized, capable of stand-alone operation with sufficient memory to support its operating system, database, and programming requirements, and with sufficient I/O capacity for the application.
1. Configuration: Local keypad and display; diagnostic LEDs for power, communication, and processor; wiring termination to terminal strip or card connected with ribbon cable; memory with bios; and 72 hour battery backup.
 2. Operating System: Manage I/O communication to allow distributed controllers to share real and virtual object information and allow central monitoring and alarms. Perform scheduling with real-time clock. Perform automatic system diagnostics; monitor system and report failures.
 3. ASHRAE 135 Compliance.
 4. Enclosure: Dust and water proof rated for operation at 40 to 150 deg F (5 to 65 deg C).

2.5 ALARM PANELS

- A. Unitized cabinet with suitable brackets for wall or floor mounting. Fabricate of 0.06-inch- (1.5-mm-) thick, furniture-quality steel or extruded-aluminum alloy, totally enclosed, with hinged doors and keyed lock and with manufacturer's standard shop-painted finish. Provide common keying for all panels.
- B. Indicating light for each alarm point, single horn, acknowledge switch, and test switch, mounted on hinged cover.
1. Alarm Condition: Indicating light flashes and horn sounds.
 2. Acknowledge Switch: Horn is silent and indicating light is steady.
 3. Alarm Condition Cleared: System is reset and indicating light is extinguished.

2.6 ANALOG CONTROLLERS

- A. Step Controllers: 6- or 10-stage type, with heavy-duty switching rated to handle loads and operated by electric motor.
- B. Electric, Outdoor-Reset Controllers: Remote-bulb or bimetal rod-and-tube type, proportioning action with adjustable throttling range, adjustable set point, scale range minus 10 to plus 70 deg F (minus 23 to plus 21 deg C), and single- or double-pole contacts.
- C. Electronic Controllers: Wheatstone-bridge-amplifier type, in steel enclosure with provision for remote-resistance readjustment. Identify adjustments on controllers, including proportional band and authority.
- D. Receiver Controllers: Single- or multiple-input models with control-point adjustment, direct or reverse acting with mechanical set-point adjustment with locking device, proportional band adjustment, authority adjustment, and proportional control mode.

2.7 TIME CLOCKS

- A. Manufacturers:
 - 1. SSAC Inc.; ABB USA.
 - 2. TCS/Basys Controls.
 - 3. Time Mark Corporation.
- B. Solid-state, programmable time control with 8 separate programs each with up to 100 on-off operations; 1-second resolution; lithium battery backup; keyboard interface and manual override; individual on-off-auto switches for each program; 365-day calendar with 20 programmable holidays; choice of fail-safe operation for each program; system fault alarm; and communications package.

2.8 ELECTRONIC SENSORS

- A. Description: Vibration and corrosion resistant; for wall, immersion, or duct mounting as required.
- B. Thermistor Temperature Sensors and Transmitters:
 - 1. Manufacturers:
 - a. BEC Controls Corporation.
 - b. MAMAC Systems, Inc.
 - c. RDF Corporation.
 - d. Trane; Worldwide Applied Systems Group
 - 2. Accuracy: Plus or minus 0.5 deg F (0.3 deg C) at calibration point.
 - 3. Wire: Twisted, shielded-pair cable.

4. Insertion Elements in Ducts: Single point, 18 inches (460 mm) long; use where not affected by temperature stratification or where ducts are smaller than 9 sq. ft. (0.84 sq. m).
5. Averaging Elements in Ducts: 18 inches (460 mm) long, rigid; use where prone to temperature stratification or where ducts are larger than 10 sq. ft. (1 sq. m).
6. Insertion Elements for Liquids: Brass or stainless-steel socket with minimum insertion length of 2-1/2 inches (64 mm).
7. Room Sensor Cover Construction: Manufacturer's standard locking covers.
 - a. Set-Point Adjustment: Concealed.
 - b. Set-Point Indication: Concealed.
 - c. Thermometer: Concealed.
 - d. Orientation: Horizontal.
8. Outside-Air Sensors: Watertight inlet fitting, shielded from direct sunlight.
9. Room Security: Stainless-steel cover plate with insulated back and security screws.

C. RTDs and Transmitters:

1. Manufacturers:
 - a. BEC Controls Corporation.
 - b. MAMAC Systems, Inc.
 - c. RDF Corporation.
2. Accuracy: Plus or minus 0.2 percent at calibration point.
3. Wire: Twisted, shielded-pair cable.
4. Insertion Elements in Ducts: Single point, 18 inches (460 mm) long; use where not affected by temperature stratification or where ducts are smaller than 9 sq. ft. (0.84 sq. m).
5. Averaging Elements in Ducts: 24 inches (610 mm) long, rigid; use where prone to temperature stratification or where ducts are larger than 9 sq. ft. (0.84 sq. m); length as required.
6. Insertion Elements for Liquids: Brass socket with minimum insertion length of 2-1/2 inches (64 mm).
7. Room Sensor Cover Construction: Manufacturer's standard locking covers.
 - a. Set-Point Adjustment: Concealed.
 - b. Set-Point Indication: Concealed.
 - c. Thermometer: Concealed.
 - d. Orientation: Horizontal.
8. Outside-Air Sensors: Watertight inlet fitting, shielded from direct sunlight.
9. Room Security: Stainless-steel cover plate with insulated back and security screws.

D. Pressure Transmitters/Transducers:

1. Manufacturers:
 - a. BEC Controls Corporation.

- b. MAMAC Systems, Inc.
 - c. TCS/Basys Controls.
 - d. Vaisala.
2. Static-Pressure Transmitter: Nondirectional sensor with suitable range for expected input, and temperature compensated.
- a. Accuracy: 2 percent of full scale with repeatability of 0.5 percent.
 - b. Output: 4 to 20 mA.
 - c. Building Static-Pressure Range: 0- to 0.25-inch wg (0 to 62 Pa).
 - d. Duct Static-Pressure Range: 0- to 5-inch wg (0 to 1240 Pa).
3. Water Pressure Transducers: Stainless-steel diaphragm construction, suitable for service; minimum 150-psig (1034-kPa) operating pressure; linear output 4 to 20 mA.
4. Water Differential-Pressure Transducers: Stainless-steel diaphragm construction, suitable for service; minimum 150-psig (1034-kPa) operating pressure and tested to 300-psig (2070-kPa); linear output 4 to 20 mA.
5. Differential-Pressure Switch (Air or Water): Snap acting, with pilot-duty rating and with suitable scale range and differential.
6. Pressure Transmitters: Direct acting for gas or liquid service; range suitable for system; linear output 4 to 20 mA.

2.9 STATUS SENSORS

- A. Status Inputs for Fans: Differential-pressure switch with pilot-duty rating and with adjustable range of 0- to 5-inch wg (0 to 1240 Pa).
- B. Status Inputs for Pumps: Differential-pressure switch with pilot-duty rating and with adjustable pressure-differential range of 8 to 60 psig (55 to 414 kPa), piped across pump.
- C. Status Inputs for Electric Motors: Comply with ISA 50.00.01, current-sensing fixed- or split-core transformers with self-powered transmitter, adjustable and suitable for 175 percent of rated motor current.
- D. Voltage Transmitter (100- to 600-V ac): Comply with ISA 50.00.01, single-loop, self-powered transmitter, adjustable, with suitable range and 1 percent full-scale accuracy.
- E. Current Switches: Self-powered, solid-state with adjustable trip current, selected to match current and system output requirements.
- F. Electronic Valve/Damper Position Indicator: Visual scale indicating percent of travel and 2- to 10-V dc, feedback signal.
- G. Water-Flow Switches: Bellows-actuated mercury or snap-acting type with pilot-duty rating, stainless-steel or bronze paddle, with appropriate range and differential adjustment, in NEMA 250, Type 1 enclosure.

2.10 GAS DETECTION EQUIPMENT

- A. Manufacturers:
 - 1. MSA Canada Inc.
 - 2. TSI Incorporated.
 - 3. Vaisala.
 - 4. Vulcain Inc.
- B. Carbon Monoxide Detectors: Single or multichannel, dual-level detectors using solid-state plug-in sensors with a 3-year minimum life; suitable over a temperature range of 32 to 104 deg F (0 to 40 deg C); with 2 factory-calibrated alarm levels at 50 and 100 ppm.

2.11 THERMOSTATS

- A. Manufacturers:
 - 1. Erie Controls.
 - 2. Trane; Worldwide Applied Systems Group
 - 3. Danfoss Inc.; Air-Conditioning and Refrigeration Div.
 - 4. Heat-Timer Corporation.
 - 5. Sauter Controls Corporation.
 - 6. Tekmar Control Systems, Inc.
- B. Electric, solid-state, room thermostat.
 - 1. Automatic switching from heating to cooling.
 - 2. Preferential rate control to minimize overshoot and deviation from set point.
 - 3. Set up for four separate temperatures per day.
 - 4. Instant override of set point for continuous or timed period from 1 hour to 31 days.
 - 5. Short-cycle protection.
 - 6. Programming based on every day of week.
 - 7. Selection features include degree F or degree C display, 12- or 24-hour clock, keyboard disable, and fan on-auto.
 - 8. Battery replacement without program loss.
 - 9. Thermostat display features include the following:
 - a. Time of day.
 - b. Actual room temperature.
 - c. Programmed temperature.
 - d. Programmed time.
 - e. Duration of timed override.
 - f. Day of week.
 - g. System mode indications include "heating," "off," "fan auto," and "fan on."
- C. Low-Voltage, On-Off Thermostats: NEMA DC 3, 24-V, bimetal-operated, mercury-switch type, with adjustable or fixed anticipation heater, concealed set-point adjustment, 55 to 85 deg F (13 to 30 deg C) set-point range, and 2 deg F (1 deg C) maximum differential.

- D. Remote-Bulb Thermostats: On-off or modulating type, liquid filled to compensate for changes in ambient temperature; with copper capillary and bulb, unless otherwise indicated.
1. Bulbs in water lines with separate wells of same material as bulb.
 2. Bulbs in air ducts with flanges and shields.
 3. Averaging Elements: Copper tubing with either single- or multiple-unit elements, extended to cover full width of duct or unit; adequately supported.
 4. Scale settings and differential settings are clearly visible and adjustable from front of instrument.
 5. On-Off Thermostat: With precision snap switches and with electrical ratings required by application.
 6. Modulating Thermostats: Construct so complete potentiometer coil and wiper assembly is removable for inspection or replacement without disturbing calibration of instrument.
- E. Immersion Thermostat: Remote-bulb or bimetal rod-and-tube type, proportioning action with adjustable throttling range and adjustable set point.
- F. Airstream Thermostats: Two-pipe, fully proportional, single-temperature type; with adjustable set point in middle of range, adjustable throttling range, plug-in test fitting or permanent pressure gage, remote bulb, bimetal rod and tube, or averaging element.
- G. Electric, Low-Limit Duct Thermostat: Snap-acting, single-pole, single-throw, manual-reset switch that trips if temperature sensed across any 12 inches (300 mm) of bulb length is equal to or below set point.
1. Bulb Length: Minimum 20 feet (6 m).
 2. Quantity: One thermostat for every 20 sq. ft. (2 sq. m) of coil surface.
- H. Electric, High-Limit Duct Thermostat: Snap-acting, single-pole, single-throw, manual-reset switch that trips if temperature sensed across any 12 inches (300 mm) of bulb length is equal to or above set point.
1. Bulb Length: Minimum 20 feet (6 m).
 2. Quantity: One thermostat for every 20 sq. ft. (2 sq. m) of coil surface.

2.12 ACTUATORS

- A. Electric Motors: Size to operate with sufficient reserve power to provide smooth modulating action or two-position action.
1. Permanent Split-Capacitor or Shaded-Pole Type: Gear trains completely oil immersed and sealed. Equip spring-return motors with integral spiral-spring mechanism in housings designed for easy removal for service or adjustment of limit switches, auxiliary switches, or feedback potentiometer.
 2. Spring-Return Motors for Valves: Size for running and breakaway torque of 150 in. x lbf (16.9 N x m).
 3. Spring-Return Motors for Dampers: Size for running and breakaway torque of 150 in. x lbf (16.9 N x m).

B. Electronic Actuators: Direct-coupled type designed for minimum 60,000 full-stroke cycles at rated torque.

1. Valves: Size for torque required for valve close off at maximum pump differential pressure.
2. Dampers: Size for running torque calculated as follows:
 - a. Opposed-Blade Damper with Edge Seals: 5 inch-lb/sq. ft. (62 kg-cm/sq. m) of damper.
 - b. Dampers with 2- to 3-Inch wg (500 to 750 Pa) of Pressure Drop or Face Velocities of 1000 to 2500 fpm (5 to 13 m/s): Increase running torque by 1.5.
 - c. Dampers with 3- to 4-Inch wg (750 to 1000 Pa) of Pressure Drop or Face Velocities of 2500 to 3000 fpm (13 to 15 m/s): Increase running torque by 2.0.
3. Coupling: V-bolt and V-shaped, toothed cradle.
4. Overload Protection: Electronic overload or digital rotation-sensing circuitry.
5. Fail-Safe Operation: Mechanical, spring-return mechanism. Provide external, manual gear release on nonspring-return actuators.
6. Power Requirements (Two-Position Spring Return): 24-V ac.
7. Power Requirements (Modulating): Maximum 10 VA at 24-V ac or 8 W at 24-V dc.
8. Proportional Signal: 2- to 10-V dc or 4 to 20 mA, and 2- to 10-V dc position feedback signal.
9. Temperature Rating: Minus 22 to plus 122 deg F (Minus 30 to plus 50 deg C).
10. Temperature Rating (Smoke Dampers): Minus 22 to plus 250 deg F (Minus 30 to plus 121 deg C).
11. Run Time: 12 seconds open, 5 seconds closed.

2.13 CONTROL VALVES

A. Manufacturers:

1. Danfoss Inc.; Air Conditioning & Refrigeration Div.
2. Erie Controls.
3. Magnatrol Valve Corporation.
4. Neles-Jamesbury.

B. Control Valves: Factory fabricated, of type, body material, and pressure class based on maximum pressure and temperature rating of piping system, unless otherwise indicated.

C. Hydronic system globe valves shall have the following characteristics:

1. NPS 2 (DN 50) and Smaller: Class 125 bronze body, bronze trim, rising stem, renewable composition disc, and screwed ends with backseating capacity repackable under pressure.
2. NPS 2-1/2 (DN 65) and Larger: Class 125 iron body, bronze trim, rising stem, plug-type disc, flanged ends, and renewable seat and disc.
3. Internal Construction: Replaceable plugs and stainless-steel or brass seats.
 - a. Double-Seated Valves: Balanced plug; cage trim provides seating and guiding surfaces for plugs on top and bottom.

4. Sizing: 3-psig (21-kPa) maximum pressure drop at design flow rate or the following:
 - a. Two Position: Line size.
 - b. Two-Way Modulating: Either the value specified above or twice the load pressure drop, whichever is more.
 - c. Three-Way Modulating: Twice the load pressure drop, but not more than value specified above.
 5. Flow Characteristics: Two-way valves shall have equal percentage characteristics; three-way valves shall have linear characteristics.
 6. Close-Off (Differential) Pressure Rating: Combination of actuator and trim shall provide minimum close-off pressure rating of 150 percent of total system (pump) head for two-way valves and 100 percent of pressure differential across valve or 100 percent of total system (pump) head.
- D. Butterfly Valves: 200-psig (1380-kPa), 150-psig (1034-kPa) maximum pressure differential, ASTM A 126 cast-iron or ASTM A 536 ductile-iron body and bonnet, extended neck, stainless-steel stem, field-replaceable EPDM or Buna N sleeve and stem seals.
1. Body Style: Lug.
 2. Disc Type: Elastomer-coated ductile iron.
 3. Sizing: 1-psig (7-kPa) maximum pressure drop at design flow rate.

2.14 DAMPERS

A. Manufacturers:

1. Air Balance Inc.
2. Don Park Inc.; Autodamp Div.
3. TAMCO (T. A. Morrison & Co. Inc.).
4. United Enertech Corp.

B. Dampers: AMCA-rated, opposed-blade design; 0.108-inch- (2.8-mm-) minimum thick, galvanized-steel or 0.125-inch- (3.2-mm-) minimum thick, extruded-aluminum frames with holes for duct mounting; damper blades shall not be less than 0.064-inch- (1.6-mm-) thick galvanized steel with maximum blade width of 8 inches (200 mm) and length of 48 inches (1220 mm).

1. Secure blades to 1/2-inch- (13-mm-) diameter, zinc-plated axles using zinc-plated hardware, with oil-impregnated sintered bronze blade bearings, blade-linkage hardware of zinc-plated steel and brass, ends sealed against spring-stainless-steel blade bearings, and thrust bearings at each end of every blade.
2. Operating Temperature Range: From minus 40 to plus 200 deg F (minus 40 to plus 93 deg C).
3. Edge Seals, Low-Leakage Applications: Use inflatable blade edging or replaceable rubber blade seals and spring-loaded stainless-steel side seals, rated for leakage at less than 10 cfm per sq. ft. (50 L/s per sq. m) of damper area, at differential pressure of 4-inch

wg (1000 Pa) when damper is held by torque of 50 in. x lbf (5.6 N x m); when tested according to AMCA 500D.

2.15 CONTROL CABLE

- A. Provide electronic and fiber-optic cables for control wiring.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Implement all features of programs to specified requirements and as appropriate to sequence of operation.
- B. Connect and configure equipment and software to achieve sequence of operation specified.
- C. Verify location of thermostats and other exposed control sensors with Drawings and room details before installation. Install devices 60 inches (1530 mm) above the floor.
- D. Install automatic dampers according to Section "Duct Accessories."
- E. Install damper motors on outside of duct in warm areas, not in locations exposed to outdoor temperatures.
- F. Install labels and nameplates to identify control components according to Section "Mechanical Identification."
- G. Install hydronic instrument wells, valves, and other accessories according to Section "Hydronic Piping."
- H. Install duct volume-control dampers according to Sections specifying air ducts.

3.2 ELECTRICAL WIRING AND CONNECTION INSTALLATION

- A. Install building wire and cable according to Division 26 Section "Conductors and Cables."
 - 1. Conceal cable, except in mechanical rooms and areas where other conduit and piping are exposed.
 - 2. Install exposed and concealed cable in raceway.
 - 3. Number-code or color-code conductors for future identification and service of control system, except local individual room control cables.
 - 4. Install wire and cable with sufficient slack and flexible connections to allow for vibration of piping and equipment.

- B. Connect manual-reset limit controls independent of manual-control switch positions. Automatic duct heater resets may be connected in interlock circuit of power controllers.
- C. Connect hand-off-auto selector switches to override automatic interlock controls when switch is in hand position.

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
- B. Perform the following field tests and inspections and prepare test reports:
 - 1. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation. Remove and replace malfunctioning units and retest.
 - 2. Test and adjust controls and safeties.
 - 3. Test calibration of electronic controllers.
 - 4. Test each point through its full operating range.
 - 5. Test each control loop and adjust actions.
 - 6. Test each system for compliance with sequence of operation.
 - 7. Test interlocks.
- C. Verification:
 - 1. Verify that instruments are installed before calibration, testing, and loop or leak checks.
 - 2. Check instruments for proper location and accessibility.
 - 3. Check instrument installation for direction of flow, elevation, orientation, insertion depth, and other applicable considerations.
 - 4. Check instrument tubing for proper fittings, slope, material, and support.
 - 5. Check flow instruments. Inspect tag number and line and bore size, and verify that inlet side is identified and that meters are installed correctly.
 - 6. Check pressure instruments, piping slope, installation of valve manifold, and self-contained pressure regulators.
 - 7. Check temperature instruments and material and length of sensing elements.
 - 8. Check control valves. Verify that they are in correct direction.
 - 9. Check dampers. Verify that proper blade alignment has been provided.
- D. Replace damaged or malfunctioning controls and equipment and repeat testing procedures.

3.4 ADJUSTING

- A. Calibrating and Adjusting:
 - 1. Calibrate equipment and procedures using manufacturer's written recommendations and instruction manuals. Use test equipment with accuracy at least double that of instrument being calibrated.
 - 2. Control System Inputs and Outputs:

- a. Check analog inputs at 0, 50, and 100 percent of span.
 - b. Check analog outputs using milliampere meter at 0, 50, and 100 percent output.
 - c. Check digital inputs using jumper wire.
 - d. Check digital outputs using ohmmeter to test for contact making or breaking.
 - e. Check resistance temperature inputs at 0, 50, and 100 percent of span using a precision-resistant source.
3. Flow:
- a. Set differential pressure flow transmitters for 0 and 100 percent values with 3-point calibration accomplished at 50, 90, and 100 percent of span.
 - b. Manually operate flow switches to verify that they make or break contact.
4. Pressure:
- a. Calibrate pressure transmitters at 0, 50, and 100 percent of span.
 - b. Calibrate pressure switches to make or break contacts, with adjustable differential set at minimum.
5. Temperature:
- a. Calibrate resistance temperature transmitters at 0, 50, and 100 percent of span using a precision-resistance source.
 - b. Calibrate temperature switches to make or break contacts.
6. Stroke and adjust control valves and dampers without positioners, following the manufacturer's recommended procedure, so that valve or damper is 100 percent open and closed.
7. Stroke and adjust control valves and dampers with positioners, following manufacturer's recommended procedure, so that valve and damper is 0, 50, and 100 percent closed.
8. Provide diagnostic and test instruments for calibration and adjustment of system.
9. Provide written description of procedures and equipment for calibrating each type of instrument. Submit procedures review and approval before initiating startup procedures.
- B. Adjust initial temperature set points.
- C. 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.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train City of New York's maintenance personnel to adjust, operate, and maintain HVAC instrumentation and controls. Refer to General Conditions Sections.

END OF SECTION 23 09 00

SECTION 230993

SEQUENCE OF OPERATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes control sequences for HVAC systems, subsystems, and equipment.
- B. Related Sections include the following:
 - 1. Section "HVAC Instrumentation and Controls" for control equipment and devices and for submittal requirements.

1.3 SUBMITTALS

- A. Shop Drawings: Submit shop drawings for each system automatically controlled, containing the following information:
 - 1. Schematic flow diagram of system showing fans, dampers, and control devices.
 - 2. Label each control device with setting or adjustable range of control.
 - 3. Indicate factory and field wiring.
 - 4. Indicate each control panel required, with internal and external wiring clearly indicated. Provide detail of panel face, including controls, instruments, and labeling. Include verbal description of sequence of operation.
 - 5. Point-to-point wiring diagram indicating control and power wiring.
- B. Maintenance Data: Include copy of shop drawings in each maintenance manual in accordance with requirements of General Conditions.

1.4 HEATING CONTROL SEQUENCES

- A. Boilers:
 - 1. Start and Stop Boiler(s): start and stop of the boilers and related pumps shall be through the boiler control panel. The boilers shall be energized whenever the outside air temperature is less than 65°F (adjustable) .

2. Once the boilers are indexed to operate, the combustion air dampers shall open. The reverse shall occur once the last boiler is de-energized.
 3. Manual actuation of the break-glass, emergency boiler shutdown switch outside the boiler room shall shut down the boiler, stop the pumps and sound a local alarm. The same action shall occur on a sensing of high carbon monoxide levels in the boiler room.
 4. Alarm boiler(s) Start Failure:
 - a. Output Device: local alarm.
 - b. Action: local "failure-to-start" indication.
 - c. There shall be no change to the operating status of the hot water pumps during a boiler failure. The pumps shall continue to operate.
 5. Heating-Water Supply Temperature Control:
 - a. Input Device: hot water supply temperature sensor.
 - b. Output Device: burner modulation.
 - c. Action: Modulate burner to maintain heating-water supply temperature.
 6. A boiler shall be fired when the temperature, as indicated by an immersion well sensor on the hot water supply, indicates that the hot water supply temperature is below set point.
 7. On a rise in hot water supply temperature above set point, the boiler shall be de-energized.
 8. Boilers shall not fire unless the pumps P-1 and P-2 are operating.
- B. Control Primary Hot Water Circulating Pump(s):
1. The hot water pumps P-1 and P-2 shall be energized when the outside air temperature drops below 65°F or if indexed to operate. The local control panel shall also be capable of automatic alternation of the lead and lag pumps based on run-time hours. The local control panel shall be capable of providing adjustments to the run-time hour limit for the lead pump. A manual Lead Pump-Select Switch shall be also placed on the face of the local control panel and shall allow selection of the lead Pump.
 2. In the event that the lead Pump fails, as sensed by a Differential Pressure Switch, the lag Pump shall be automatically started and an Audible And Visual Alarm shall be energized. A Silence Switch and light shall allow silencing of the Audible Alarm.
 3. A reset button shall be placed on the face of the Control Panel, clear the alarm, after the Pump failure is corrected.
 4. Pilot Lights on the face of the Control Panel shall indicate normal operation (green only), lag Pump operation (green and red) and no-flow condition (red only).
 5. Whenever the outside air temperature is above 65°F. (adjustable), the Pumps shall be stopped.
 6. Input Device: boiler control panel.
 7. Output Device: electronic signal to pump starter relay.
 8. Action: Energize pump(s) at outdoor-air temperatures below 65 deg F (18 deg C).
 - a. Local panel shall indicate operating status of primary circulating pump(s).
 - b. Local panel shall indicate outside air temperature.
 - c. Local panel shall indicate hot water supply temperature.
 - d. Local panel shall indicate hot water return temperature.
- C. Boiler sequencing:
1. Input Device: boiler control panel as reset by outdoor air temperature sensor.
 2. Output Device: burners.

3. Action: upon drop in hot water boiler supply temperature, boilers shall be sequenced to fire, to maintain the hot water boiler supply temperature as resrt by outdoor air temperature controller.
 4. Time delay: 5 minutes (adjustable) time delay shall prevent the next boiler to be started after a boiler is started.
 5. Restart time delay: 5 minutes (adjustable) time delay shall prevent a boiler from re-starting.
- D. Freeze protection pumps: energize pumps via space air temperature sensor when temperature drops below 40 deg F.
- E. Variable frequency drives (VFD) pumps P-1 and P-2:
1. Input Device: hot water supply and return temperature sensors and temperature differential controller.
 2. Output Device: VFD's for P-1 and P-2 pumps.
 3. Action: VFD's shall vary the pump speed to maintain the constant temperature difference of 20°F (adjustable) between hot water supply and return temperature.
- F. Hot Water Supply Temperature Reset:
1. Input Device: Electric, outdoor-air-reset controller and associated outdoor-air sensor and hot water boiler supply temperature sensor.
 2. Output Device: boiler control panel.
 3. Action: Reset heating-water supply temperature in straight-line relationship with outdoor-air temperature for the following conditions:
 - a. 190 deg F (adjustable) heating water when outdoor-air temperature is 0 deg F (adjustable).
 - b. 100 deg F (adjustable) heating water when outdoor-air temperature is 65 deg F (adjustable).
 - c. 100 deg F (adjustable) minimum, heating-water temperature.

1.5 AIR COOLED SPLIT UNIT CONTROL SEQUENCE

- A. Multiple FCU units within one zone shall be controlled during cooling seasons by a 7-Day, programmable, wall mounted thermostat (as indicated on mechanical drawings). The thermostat shall be wired to the wall-mounted units within the zone to energize the units in cooling demand.
- B. Single FCU units within one zone shall be controlled during cooling seasons by manufacturer's remote thermostat.
- C. The control of the air conditioning systems shall be via the factory furnished controls on the evaporator, condenser and refrigerant manifold. The units shall also be hard-wire interlocked and shall operate on low-voltage control signals.
1. Evaporator fan shall operate constantly.
 2. On call for cooling the related condensing unit shall be started.
 3. As space temperature is satisfied condensing units shall be cycled off.

D. Heating

1. FCU units should not operate in heating mode.

1.6 MISCELLANEOUS CONTROL SEQUENCES TYPICAL TO ALL AIR SYSTEMS

A. Fire smoke dampers and associated controls:

1. Upon signal from the fire alarm system or detection of smoke, the fire smoke dampers shall close. All fire smoke dampers shall be furnished with an end switch. Closure of the damper shall be proven by the end switch furnished as part of each fire smoke damper. Closure of any damper shall, through a hardwired interlock, shut down the associated fan system.
2. All fire/smoke dampers shall be interlocked with their respective air handling systems. All fire/smoke dampers shall be normally closed, and shall open when the associated air handling system or fan system is started by the building management system. This shall apply to all supply air, return air, outside air and exhaust air fire/smoke dampers.
3. Activation of a duct smoke detector shall result in the fire alarm system taking control and shutting down the air handling equipment associated with that duct smoke detector. The air handling systems shall not be reset until the alarm associated with the duct smoke detector is cleared and then the air handling system will be restarted from the building management system.
4. The fire alarm system shall send either a "normal" signal or "alarm" signal to the building management system. If a normal signal is being transmitted, then the air handling systems in the building will function under their respective normal modes. If an alarm system is being transmitted, then the building management system will not permit the air handling systems in the building to operate until the alarm has been cleared at the fire alarm system or, is overridden by the fireman's key located in the fire alarm system.
5. The fire alarm system shall transmit alarm signals to the building management system to indicate which specific air handling equipment is being controlled by the fire alarm system. Refer to above for normal and alarm modes of operation.

1.7 FRESH AIR UNIT VENTILATION CONTROL SEQUENCE

- (1) Unit shall be started & stopped via a remote operator interface & factory controls. Once started, the unit shall automatically, revert to heating & cooling mode based on outside air temperature input. If the outside air temperature is below 55 degrees F (adjustable) the unit controls shall revert to the heating mode. If the outside air temperature is above 55 degrees F (adjustable) the unit factory controls shall revert to the cooling mode.
- (2) The motorized dampers at the unit discharge shall be interlocked with the fan starter & unit factory controls. The damper shall be normally closed, and powered open when the unit is energized.
- (3) The unit factory controls shall sequence gas furnaces to maintain a adjustable discharge temperature during the heating mode.
- (4) The unit factory controls shall cycle the compressors on & off to maintain a adjustable discharge temperature during the cooling mode.

- (5) In occupied dehumidification mode is enabled on outside air dew point enable set point. Outdoor air dew point is calculated based on readings from outdoor air temperature sensor and outdoor air relative humidity sensor. If enabled, Dehumidification is activated when evaporator leaving air temperature, as sensed by the evaporator leaving air temperature sensor is \geq evaporator dehumid. temp. set point.
 - (6) In unoccupied mode when no call for dehumidification is present, cooling is enabled on space temperature as sensed by the space temperature sensor. Cooling mode is activated when space temperature is \geq the unocc. space cooling set point $+2^{\circ}\text{F}$ and de-activated at NSCS -1°F . Unoccupied unit operation is identical to occupied cooling operation except call is enabled and disabled based on space temperature.
 - (7) In unoccupied heating mode when no call for dehumidification or cooling is present, heating is enabled on space temperature as sensed by the space temperature sensor. Heating mode is activated when space temperature is \leq the unocc space heating set point -2°F and de-activated at NSHS $+1^{\circ}\text{F}$. Unoccupied unit operation is identical to Occupied Heating operation except call is enabled and disabled based on space temperature.
 - (8) The heating mode, cooling mode, alarm conditions status shall be monitored by the unit factory controls.
 - (9) Upon sensing smoke in the supply air duct by the Duct Smoke Detector, the unit shall shut down & initiate an alarm at the Building Fire Alarm Control Panel.
- A. Filter status (dirty, clean, etc.) and pressure drop (set at maximum 0.75" w.g.), (adjustable), shall be monitored via the unit factory controls.

1.8 VENTILATION SEQUENCES

- A. Toilet Exhaust Fans:
1. Room switch or control system schedule to energize fan or de-energize fan.
- B. Dark Room Exhaust Fan:
1. Exhaust Fan shall be manually started with a Remote Wall Mounted Switch that shall be coordinated with the hood exhaust controls. Coordinate with electrical contractor as required for interlocking of controls. The fan shall operate in either the high speed or low speed mode as indexed by the hood controls.
 2. Exhaust Fan shall keep operating for a 30-minute period (adjustable), after the Switch has been placed in OFF position.
 3. The normally closed, powered open, motorized damper at the discharge of the fan shall be interlocked with the starter circuit of the fan to open when the unit is energized and close when the unit is de-energized. The damper shall be provided with an end switch that shall enable the unit to start only when closed. Failure of the damper to open will not permit the unit to open.
- C. Miscellaneous Exhaust Fans:
1. Exhaust fan shall be cycled on via a space-mounted thermostat set to maintain space at 72 deg F (adjustable). Interlock with outside air dampers as shown on the drawings.

2. Prior to fan start, the damper at the inlet to the fan shall open. Only once the motorized damper end switch has close, shall the fan operate.
- D. Gas Meter (RPZ) Room Exhaust Fan:
1. Fan shall operate continuously, and shall controlled via a local switch located on the outside wall of the gas meter room. The switch shall be locking type and tamper proof to prevent accidental de-energizing of the fan. The switch shall be provided with pilot lights (green light operating; red light trouble/off).
 2. The normally closed, powered open, motorized damper at the inlet of the fan shall be interlocked with the starter circuit of the fan to open when the fan is energized and close when the fan is de-energized. The damper shall be provided with an end switch that shall enable the fan to start only when opened.
- E. Combustion-Air, Make-up Air Dampers: Power open normally closed dampers when served appliance burner(s) start. Close dampers when the appliance is de-energized. Typical requirements shall apply to boilers.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 23 09 93

SECTION 232113

HYDRONIC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes pipe and fitting materials, joining methods, special-duty valves, and specialties for the following:
 - 1. Hot-water heating piping.
 - 2. Glycol water piping.
 - 3. Makeup-water piping.
 - 4. Condensate-drain piping.
 - 5. Blowdown-drain piping.
 - 6. Air-vent piping.
 - 7. Safety-valve-inlet and -outlet piping.
- B. Related Sections include the following:
 - 1. Section "Hydronic Pumps" for pumps, motors, and accessories for hydronic piping.

1.3 PERFORMANCE REQUIREMENTS

- A. Hydronic piping components and installation shall be capable of withstanding the following minimum working pressure and temperature:
 - 1. Hot-Water Heating Piping: 150 psig at 200 deg F (93 deg C).
 - 2. Glycol Water Piping: 300 psig at 400 deg F (186 deg C).
 - 3. Makeup-Water Piping: 80 psig (552 kPa)] at 50 deg F (22 deg C).
 - 4. Condensate-Drain Piping: 50 deg F (22 deg C) .
 - 5. Blowdown-Drain Piping: 200 deg F (93 deg C).
 - 6. Air-Vent Piping: 200 deg F (93 deg C).

7. Safety-Valve-Inlet and -Outlet Piping: Equal to the pressure of the piping system to which it is attached.

1.4 SUBMITTALS

- A. Product Data: For each type of the following:
1. Valves. Include flow and pressure drop curves based on manufacturer's testing for calibrated-orifice balancing valves and automatic flow-control valves.
 2. Air control devices.
 3. Chemical treatment.
 4. Hydronic specialties.
- B. Shop Drawings: Detail, at 1/4 (1:50) scale, the piping layout, fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides, expansion joints and loops, and attachments of the same to the building structure. Detail location of anchors, alignment guides, and expansion joints and loops.
- C. Welding certificates.
- D. Qualification Data: For Installer.
- E. Field quality-control test reports.
- F. Operation and Maintenance Data: For air control devices, hydronic specialties, and special-duty valves to include in emergency, operation, and maintenance manuals.
- G. Water Analysis: Submit a copy of the water analysis to illustrate water quality available at Project site.

1.5 QUALITY ASSURANCE

- A. Steel Support Welding: Qualify processes and operators according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.
1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
 2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
- C. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME

label. Fabricate and stamp air separators and expansion tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

1.6 EXTRA MATERIALS

- A. Water-Treatment Chemicals: Furnish enough chemicals for initial system startup and for preventive maintenance for one year from date of Substantial Completion.
- B. Differential Pressure Meter: For each type of balancing valve and automatic flow control valve, include flowmeter, probes, hoses, flow charts, and carrying case.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

- A. Drawn-Temper Copper Tubing: ASTM B 88, Type L (ASTM B 88M, Type B).
- B. DWV Copper Tubing: ASTM B 306, Type DWV.

2.2 JOINING MATERIALS

- A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - 1. ASME B16.21, nonmetallic, flat, asbestos free, 1/8-inch (3.2-mm) maximum thickness unless thickness or specific material is indicated.
- B. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for joining copper with copper; or BAg-1, silver alloy for joining copper with bronze or steel.
- C. Gasket Material: Thickness, material, and type suitable for fluid to be handled and working temperatures and pressures.

2.3 DIELECTRIC FITTINGS

- A. Description: Combination fitting of copper-alloy and ferrous materials with threaded, brazed-joint, plain, or weld-neck end connections that match piping system materials.
- B. Insulating Material: Suitable for system fluid, pressure, and temperature.
- C. Dielectric Unions:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
 - a. Capitol Manufacturing Company.
 - b. Hart Industries International, Inc.
 - c. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - d. Zurn Plumbing Products Group; AquaSpec Commercial Products Division.
 2. Factory-fabricated union assembly, for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C).
- D. Dielectric Flanges:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
 - a. Capitol Manufacturing Company.
 - b. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - c. Pipeline Seal and Insulator, Inc.
 2. Factory-fabricated companion-flange assembly, for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.
- E. Dielectric-Flange Kits:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Pipeline Seal and Insulator, Inc.
 2. Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
 3. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig (1035- or 2070-kPa) minimum working pressure where required to suit system pressures.

2.4 VALVES

- A. Automatic Temperature-Control Valves, Actuators, and Sensors: Comply with requirements specified in Section "HVAC Instrumentation and Controls."
- B. Bronze, Calibrated-Orifice, Balancing Valves:
 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following, or approved equal:

- a. Armstrong Pumps, Inc.
 - b. Bell & Gossett Domestic Pump; a division of ITT Industries.
 - c. Flow Design Inc.
 - d. Gerand Commissioning Co.
 - e. Griswold Controls.
 - f. Taco.
2. Body: Bronze, ball or plug type with calibrated orifice or venturi.
 3. Ball: Brass or stainless steel.
 4. Plug: Resin.
 5. Seat: PTFE.
 6. End Connections: Threaded or socket.
 7. Pressure Gage Connections: Integral seals for portable differential pressure meter.
 8. Handle Style: Lever, with memory stop to retain set position.
 9. CWP Rating: Minimum 125 psig (860 kPa).
 10. Maximum Operating Temperature: 250 deg F (121 deg C).
- C. Diaphragm-Operated, Pressure-Reducing Valves:
1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following, or approved equal:
 - a. Amtrol, Inc.
 - b. Armstrong Pumps, Inc.
 - c. Bell & Gossett Domestic Pump; a division of ITT Industries.
 - d. Conbraco Industries, Inc.
 - e. Spence Commissioning Company, Inc.
 - f. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 2. Body: Bronze or brass.
 3. Disc: Glass and carbon-filled PTFE.
 4. Seat: Brass.
 5. Stem Seals: EPDM O-rings.
 6. Diaphragm: EPT.
 7. Low inlet-pressure check valve.
 8. Inlet Strainer: removable without system shutdown.
 9. Valve Seat and Stem: Noncorrosive.
 10. Valve Size, Capacity, and Operating Pressure: Selected to suit system in which installed, with operating pressure and capacity factory set and field adjustable.
- D. Diaphragm-Operated Safety Valves:
1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following, or approved equal:
 - a. Amtrol, Inc.
 - b. Armstrong Pumps, Inc.
 - c. Bell & Gossett Domestic Pump; a division of ITT Industries.

- d. Conbraco Industries, Inc.
 - e. Spence Commissioning Company, Inc.
 - f. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
- 2. Body: Bronze or brass.
 - 3. Disc: Glass and carbon-filled PTFE.
 - 4. Seat: Brass.
 - 5. Stem Seals: EPDM O-rings.
 - 6. Diaphragm: EPT.
 - 7. Wetted, Internal Work Parts: Brass and rubber.
 - 8. Inlet Strainer: removable without system shutdown.
 - 9. Valve Seat and Stem: Noncorrosive.
 - 10. Valve Size, Capacity, and Operating Pressure: Comply with ASME Boiler and Pressure Vessel Code: Section IV, and selected to suit system in which installed, with operating pressure and capacity factory set and field adjustable.
- E. Automatic Flow-Control Valves:
- 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following, or approved equal:
 - a. Flow Design Inc.
 - b. Griswold Controls.
 - c. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
 - 2. Body: Brass or ferrous metal.
 - 3. Piston and Spring Assembly: Stainless steel, tamper proof, self cleaning, and removable.
 - 4. Combination Assemblies: Include bronze or brass-alloy ball valve.
 - 5. Identification Tag: Marked with zone identification, valve number, and flow rate.
 - 6. Size: Same as pipe in which installed.
 - 7. Performance: Maintain constant flow, plus or minus 5 percent over system pressure fluctuations.
 - 8. Minimum CWP Rating: 175 psig (1207 kPa).
 - 9. Maximum Operating Temperature: 250 deg F (121 deg C).

2.5 AIR CONTROL DEVICES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
- 1. Amtrol, Inc.
 - 2. Armstrong Pumps, Inc.
 - 3. Bell & Gossett Domestic Pump; a division of ITT Industries.
 - 4. Taco.
- B. Manual Air Vents:

1. Body: Bronze.
2. Internal Parts: Nonferrous.
3. Operator: Screwdriver or thumbscrew.
4. Inlet Connection: NPS 1/2 (DN 15).
5. Discharge Connection: NPS 1/8 (DN 6).
6. CWP Rating: 150 psig (1035 kPa).
7. Maximum Operating Temperature: 225 deg F (107 deg C).

C. Automatic Air Vents:

1. Body: Bronze or cast iron.
2. Internal Parts: Nonferrous.
3. Operator: Noncorrosive metal float.
4. Inlet Connection: NPS 1/2 (DN 15).
5. Discharge Connection: NPS 1/4 (DN 8).
6. CWP Rating: 150 psig (1035 kPa).
7. Maximum Operating Temperature: 240 deg F (116 deg C).

D. Bladder-Type Expansion Tanks:

1. Tank: Welded steel, rated for 125-psig (860-kPa) working pressure and 375 deg F (191 deg C) maximum operating temperature. Factory test with taps fabricated and supports installed and labeled according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
2. Bladder: Securely sealed into tank to separate air charge from system water to maintain required expansion capacity.
3. Air-Charge Fittings: Schrader valve, stainless steel with EPDM seats.
4. Tank Drain Fitting: Brass body, nonferrous internal parts; 125-psig (860-kPa) working pressure and 240 deg F (116 deg C) maximum operating temperature; constructed to admit air to compression tank, drain water, and close off system.

E. Tangential-Type Air Separators:

1. Tank: Welded steel; ASME constructed and labeled for 125-psig (860-kPa) minimum working pressure and 375 deg F (191 deg C) maximum operating temperature.
2. Air Collector Tube: Perforated stainless steel, constructed to direct released air into expansion tank.
3. Tangential Inlet and Outlet Connections: Threaded for NPS 2 (DN 50) and smaller; flanged connections for NPS 2-1/2 (DN 65) and larger.
4. Blowdown Connection: Threaded.
5. Size: Match system flow capacity.

2.6 CHEMICAL TREATMENT

- A. Bypass Chemical Feeder: Welded steel construction; 125-psig (860-kPa) working pressure; 5-gal. (19-L) capacity; with fill funnel and inlet, outlet, and drain valves.
 - 1. Chemicals: Specially formulated, based on analysis of makeup water, to prevent accumulation of scale and corrosion in piping and connected equipment.
- B. Ethylene and Propylene Glycol: Industrial grade with corrosion inhibitors and environmental-stabilizer additives for mixing with water in systems indicated to contain antifreeze or glycol solutions.

2.7 HYDRONIC PIPING SPECIALTIES

- A. Y-Pattern Strainers:
 - 1. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
 - 2. End Connections: Threaded ends for NPS 2 (DN 50) and smaller; flanged ends for NPS 2-1/2 (DN 65) and larger.
 - 3. Strainer Screen: 60-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
 - 4. CWP Rating: 125 psig (860 kPa).
- B. Stainless-Steel Bellow, Flexible Connectors:
 - 1. Body: Stainless-steel bellows with woven, flexible, bronze, wire-reinforcing protective jacket.
 - 2. End Connections: Threaded or flanged to match equipment connected.
 - 3. Performance: Capable of 3/4-inch (20-mm) misalignment.
 - 4. CWP Rating: 150 psig (1035 kPa).
 - 5. Maximum Operating Temperature: 250 deg F (121 deg C).
- C. Expansion fittings are specified in Section "Pipe Expansion Fittings and Loops."

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

- A. Hot-water heating piping, aboveground, NPS 2 (DN 50) and smaller, shall be the following:
 - 1. Type L (B), drawn-temper copper tubing, copper fittings, and brazed joints.
- B. Hot-water heating piping, aboveground, NPS 2-1/2 (DN 65) and larger, shall be the following:

1. Type L (B), drawn-temper copper tubing, copper fittings, and brazed joints.
- C. Glycol water piping, aboveground, NPS 2-1/2 (DN 65) and larger, shall be the following:
 1. Type K (A), drawn-temper copper tubing, copper fittings, and brazed joints.
- D. Makeup-water piping installed aboveground shall be the following:
 1. Type L (B), drawn-temper copper tubing, copper fittings, and soldered joints.
- E. Condensate-Drain Piping: Type L (B), drawn-temper copper tubing, copper fittings, and soldered joints.
- F. Blowdown-Drain Piping: Same materials and joining methods as for piping specified for the service in which blowdown drain is installed.
- G. Air-Vent Piping:
 1. Inlet: Same as service where installed.
 2. Outlet: Type K (A), copper tubing with brazed joints.
- H. Safety-Valve-Inlet and -Outlet Piping for Hot-Water Piping: Same materials and joining methods as for piping specified for the service in which safety valve is installed.

3.2 VALVE APPLICATIONS

- A. Install shutoff-duty valves at each branch connection to supply mains, and at supply connection to each piece of equipment.
- B. Install calibrated-orifice, balancing valves at each branch connection to return main.
- C. Install check valves at each pump discharge and elsewhere as required to control flow direction.
- D. Install safety valves at hot-water generators and elsewhere as required by ASME Boiler and Pressure Vessel Code. Install drip-pan elbow on safety-valve outlet and pipe without valves to the outdoors; and pipe drain to nearest floor drain or as indicated on Drawings. Comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1, for installation requirements.
- E. Install pressure-reducing valves at makeup-water connection to regulate system fill pressure.

3.3 PIPING INSTALLATIONS

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicate piping locations and arrangements if such 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 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. Install valves according to Section "Valves."
- 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. Select system components with pressure rating equal to or greater than system operating pressure.
- K. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.
- L. Install drains, consisting of a tee fitting, NPS 3/4 (DN 20) ball valve, and short NPS 3/4 (DN 20) threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.
- M. Install piping at a uniform grade of 0.2 percent upward in direction of flow.
- N. Reduce pipe sizes using eccentric reducer fitting installed with level side up.
- O. Install branch connections to mains using tee fittings in main pipe, with the branch connected to the bottom of the main pipe. For up-feed risers, connect the branch to the top of the main pipe.
- P. Install unions in piping, NPS 2 (DN 50) and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.

- Q. Install flanges in piping, NPS 2-1/2 (DN 65) and larger, at final connections of equipment and elsewhere as indicated.
- R. Install strainers on inlet side of each control valve, pressure-reducing valve, solenoid valve, in-line pump, and elsewhere as indicated. Install NPS 3/4 (DN 20) nipple and ball valve in blowdown connection of strainers NPS 2 (DN 50) and larger. Match size of strainer blowoff connection for strainers smaller than NPS 2 (DN 50).
- S. Install expansion loops, expansion joints, anchors, and pipe alignment guides.
- T. Identify piping.

3.4 HANGERS AND SUPPORTS

- A. Comply with the following requirements for maximum spacing of supports.
- B. Seismic restraints are specified.
- C. Install the following pipe attachments:
 - 1. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet (6 m) long.
 - 2. Adjustable roller hangers and spring hangers for individual horizontal piping 20 feet (6 m) or longer.
 - 3. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet (6 m) or longer, supported on a trapeze.
 - 4. Spring hangers to support vertical runs.
 - 5. Provide copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
- D. Install hangers for drawn-temper copper piping with the following maximum spacing and minimum rod sizes:
 - 1. NPS 3/4 (DN 20): Maximum span, 5 feet (1.5 m); minimum rod size, 1/4 inch (6.4 mm).
 - 2. NPS 1 (DN 25): Maximum span, 6 feet (1.8 m); minimum rod size, 1/4 inch (6.4 mm).
 - 3. NPS 1-1/2 (DN 40): Maximum span, 8 feet (2.4 m); minimum rod size, 3/8 inch (10 mm).
 - 4. NPS 2 (DN 50): Maximum span, 8 feet (2.4 m); minimum rod size, 3/8 inch (10 mm).
 - 5. NPS 2-1/2 (DN 65): Maximum span, 9 feet (2.7 m); minimum rod size, 3/8 inch (10 mm).
 - 6. NPS 3 (DN 80): Maximum span, 10 feet (3 m); minimum rod size, 3/8 inch (10 mm).
- E. Support vertical runs, at each floor, and at 10-foot (3-m) intervals between floors.

3.5 PIPE JOINT CONSTRUCTION

- A. Join pipe and fittings according to the following requirements and Sections specifying piping systems.
- B. Ream ends of pipes and tubes and remove burrs..
- C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
- E. 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 unless dry seal threading is specified.
 - 2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- F. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- G. Mechanically Formed, Copper-Tube-Outlet Joints: Use manufacturer-recommended tool and procedure, and brazed joints.

3.6 HYDRONIC SPECIALTIES INSTALLATION

- A. Install manual air vents at high points in piping, at heat-transfer coils, and elsewhere as required for system air venting.
- B. Install automatic air vents at high points of system piping in mechanical equipment rooms only. Manual vents at heat-transfer coils and elsewhere as required for air venting.
- C. Install piping from boiler air outlet and air separator to expansion tank with a 2 percent upward slope toward tank.
- D. Install tangential air separator in pump suction. Install blowdown piping with gate or full-port ball valve; extend full size to nearest floor drain.
- E. Install bypass chemical feeders in each hydronic system where indicated, in upright position with top of funnel not more than 48 inches (1200 mm) above the floor. Install feeder in minimum NPS 3/4 (DN 20) bypass line, from main with full-size, full-port, ball valve in the

main between bypass connections. Install NPS 3/4 (DN 20) pipe from chemical feeder drain, to nearest equipment drain and include a full-size, full-port, ball valve.

- F. Install expansion tanks on the floor. Vent and purge air from hydronic system, and ensure tank is properly charged with air to suit system Project requirements.

3.7 TERMINAL EQUIPMENT CONNECTIONS

- A. Sizes for supply and return piping connections shall be the same as or larger than equipment connections.
- B. Install control valves in accessible locations close to connected equipment.
- C. Install bypass piping with globe valve around control valve. If parallel control valves are installed, only one bypass is required.
- D. Install ports for pressure gages and thermometers at coil inlet and outlet connections according to Section "Meters and Gages."

3.8 CHEMICAL TREATMENT

- A. Perform an analysis of makeup water to determine type and quantities of chemical treatment needed to keep system free of scale, corrosion, and fouling, and to sustain the following water characteristics:
 - 1. pH: 9.0 to 10.5.
 - 2. "P" Alkalinity: 100 to 500 ppm.
 - 3. Boron: 100 to 200 ppm.
 - 4. Chemical Oxygen Demand: Maximum 100 ppm. Modify this value if closed system contains glycol.
 - 5. Corrosion Inhibitor:
 - a. Sodium Nitrate: 1000 to 1500 ppm
 - b. Molybdate: 200 to 300 ppm.
 - c. Chromate: 200 to 300 ppm.
 - d. Sodium Nitrate Plus Molybdate: 100 to 200 ppm each.
 - e. Chromate Plus Molybdate: 50 to 100 ppm each.
 - 6. Soluble Copper: Maximum 0.20 ppm.
 - 7. Tolyriazole Copper and Yellow Metal Corrosion Inhibitor: Minimum 10 ppm.
 - 8. Total Suspended Solids: Maximum 10 ppm
 - 9. Ammonia: Maximum 20 ppm.
 - 10. Free Caustic Alkalinity: Maximum 20 ppm.
 - 11. Microbiological Limits:

- a. Total Aerobic Plate Count: Maximum 1000 organisms/ml.
 - b. Total Anaerobic Plate Count: Maximum 100 organisms/ml.
 - c. Nitrate Reducers: 100 organisms/ml.
 - d. Sulfate Reducers: Maximum 0 organisms/ml.
 - e. Iron Bacteria: Maximum 0 organisms/ml.
- B. Fill system with fresh water and add liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products from piping. Circulate solution for a minimum of 24 hours, drain, clean strainer screens, and refill with fresh water.
- C. Add initial chemical treatment and maintain water quality in ranges noted above for the first year of operation.

3.9 FIELD QUALITY CONTROL

- A. Prepare hydronic piping according to ASME B31.9 and as follows:
- 1. Leave joints, including welds, uninsulated and exposed for examination during test.
 - 2. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
 - 3. Flush hydronic piping systems with clean water; then remove and clean or replace strainer screens.
 - 4. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
 - 5. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.
- B. Perform the following tests on hydronic piping:
- 1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
 - 2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
 - 3. Isolate expansion tanks and determine that hydronic system is full of water.
 - 4. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A in ASME B31.9, "Building Services Piping."
 - 5. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
 - 6. Prepare written report of testing.
- C. Perform the following before operating the system:
- 1. Open manual valves fully.

2. Inspect pumps for proper rotation.
3. Set makeup pressure-reducing valves for required system pressure.
4. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
5. Set temperature controls so all coils are calling for full flow.
6. Inspect and set operating temperatures of hydronic equipment.
7. Verify lubrication of motors and bearings.

END OF SECTION 23 21 13

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 232123

HYDRONIC PUMPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Separately coupled, vertical, in-line centrifugal pumps.

1.3 DEFINITIONS

- A. Buna-N: Nitrile rubber.
- B. EPT: Ethylene propylene terpolymer.

1.4 SUBMITTALS

- A. Product Data: Include certified performance curves and rated capacities, operating characteristics, furnished specialties, final impeller dimensions, and accessories for each type of product indicated. Indicate pump's operating point on curves.
- B. Shop Drawings: Show pump layout and connections. Include setting drawings with templates for installing foundation and anchor bolts and other anchorages.
 - 1. Wiring Diagrams: Power, signal, and control wiring.
- C. Operation and Maintenance Data: For pumps to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain hydronic pumps through one source from a single manufacturer.

- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. UL Compliance: Comply with UL 778 for motor-operated water pumps.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Manufacturer's Preparation for Shipping: Clean flanges and exposed machined metal surfaces and treat with anticorrosion compound after assembly and testing. Protect flanges, pipe openings, and nozzles with wooden flange covers or with screwed-in plugs.
- B. Store pumps in dry location.
- C. Retain protective covers for flanges and protective coatings during storage.
- D. Protect bearings and couplings against damage from sand, grit, and other foreign matter.
- E. Comply with pump manufacturer's written rigging instructions.

1.7 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases.

1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Mechanical Seals: One mechanical seal(s) for each pump.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified, or approved equal.

2.2 SEPARATELY COUPLED, VERTICAL, IN-LINE CENTRIFUGAL PUMPS

- A. Manufacturers:

1. Armstrong Pumps Inc.
 2. Aurora Pump; Division of Pentair Pump Group.
 3. Bell & Gossett; Div. of ITT Industries.
 4. PACO Pumps.
 5. Patterson Pump Co.; a Subsidiary of The Gorman-Rupp Co.
 6. Weinman; Div. of Crane Pumps & Systems.
- B. Description: Factory-assembled and -tested, centrifugal, overhung-impeller, separately coupled, in-line pump as defined in HI 1.1-1.2 and HI 1.3; designed for installation with pump and motor shafts mounted vertically. Rate pump for 175-psig (1204-kPa) minimum working pressure and a continuous water temperature of 225 deg F (107 deg C).
- C. Pump Construction:
1. Casing: Radially split, cast iron, with replaceable bronze wear rings, threaded gage tappings at inlet and outlet, and threaded companion-flange connections.
 2. Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, keyed to shaft, and secured with a locking cap screw. Trim impeller to match specified performance.
 3. Pump Shaft: Stainless steel.
 4. Mechanical Seal: Carbon rotating ring against a ceramic seat held by a stainless-steel spring, and Buna-N bellows and gasket. Include water slinger on shaft between motor and seal.
 5. Pump Bearings: Permanently lubricated ball bearings.
- D. Shaft Coupling: Axially split spacer coupling.
- E. Motor: Single speed, with permanently lubricated ball bearings, unless otherwise indicated; rigidly mounted to pump casing with lifting eye and supporting lugs in motor enclosure.
- F. Capacities and Characteristics:
1. Maximum Operating Pressure: 175 psig (1204 kPa).
 2. Maximum Continuous Operating Temperature: 225 deg F (107 deg C).
- 2.3 PUMP SPECIALTY FITTINGS
- A. Suction Diffuser: Angle pattern, 175-psig (1204-kPa) pressure rating, cast-iron body and end cap, pump-inlet fitting; with bronze startup and bronze or stainless-steel permanent strainers; bronze or stainless-steel straightening vanes; drain plug; and factory-fabricated support.
- B. Triple-Duty Valve: Angle or straight pattern, 175-psig (1204-kPa) pressure rating, cast-iron body, pump-discharge fitting; with drain plug and bronze-fitted shutoff, balancing, and check valve features. Brass gage ports with integral check valve, and orifice for flow measurement.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine equipment foundations and anchor-bolt locations for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Examine roughing-in for piping systems to verify actual locations of piping connections before pump installation.
- C. Examine foundations and inertia bases for suitable conditions where pumps are to be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PUMP INSTALLATION

- A. Install pumps with access for periodic maintenance including removal of 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. Install continuous-thread hanger rods and spring hangers with vertical-limit stop of sufficient size to support pump weight. Fabricate brackets or supports as required.
- D. Suspend vertically mounted, in-line centrifugal pumps independent of piping. Install pumps with motor and pump shafts vertical. Use continuous-thread hanger rods and spring hangers with vertical-limit stop of sufficient size to support pump weight.
- E. Set base-mounted pumps on concrete foundation. Disconnect coupling before setting. Do not reconnect couplings until alignment procedure is complete.
 - 1. Support pump baseplate on rectangular metal blocks and shims, or on metal wedges with small taper, at points near foundation bolts to provide a gap of 3/4 to 1-1/2 inches (19 to 38 mm) between pump base and foundation for grouting.
 - 2. Adjust metal supports or wedges until pump and driver shafts are level. Check coupling faces and suction and discharge flanges of pump to verify that they are level and plumb.

3.3 ALIGNMENT

- A. Align pump and motor shafts and piping connections after setting on foundation, grout has been set and foundation bolts have been tightened, and piping connections have been made.
- B. Comply with pump and coupling manufacturers' written instructions.

- C. Adjust pump and motor shafts for angular and offset alignment by methods specified in HI 1.1-1.5, "Centrifugal Pumps for Nomenclature, Definitions, Application and Operation."
- D. After alignment is correct, tighten foundation bolts evenly but not too firmly. Completely fill baseplate with nonshrink, nonmetallic grout while metal blocks and shims or wedges are in place. After grout has cured, fully tighten foundation bolts.

3.4 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to machine to allow service and maintenance.
- C. Connect piping to pumps. Install valves that are same size as piping connected to pumps.
- D. Install suction and discharge pipe sizes equal to or greater than diameter of pump nozzles.
- E. Install triple-duty valve on discharge side of pumps.
- F. Install suction diffuser and shutoff valve on suction side of pumps.
- G. Install flexible connectors on suction and discharge sides of base-mounted pumps between pump casing and valves.
- H. Install pressure gages on pump suction and discharge, at integral pressure-gage tapping, or install single gage with multiple input selector valve.
- I. Install check valve and gate or ball valve on each condensate pump unit discharge.
- J. Install electrical connections for power, controls, and devices.
- K. Ground equipment according to Division 26.
- L. Connect wiring according to Division 26.

3.5 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. 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.
- 5. Prime pump by opening suction valves and closing drains, and prepare pump for operation.
 - 6. Start motor.
 - 7. Open discharge valve slowly.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train City of New York's maintenance personnel to adjust, operate, and maintain hydronic pumps.

END OF SECTION 23 21 23

SECTION 233113

METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes metal ducts for supply, return, outside, and exhaust air-distribution systems in pressure classes from minus 2- to plus 10-inch wg (minus 500 to plus 2500 Pa). Metal ducts include the following:
 - 1. Rectangular ducts and fittings.
 - 2. Single-wall, round spiral-seam ducts and formed fittings.
 - 3. Duct liner.
- B. Related Sections include the following:
 - 1. Section "Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.3 DEFINITIONS

- A. NUSIG: National Uniform Seismic Installation Guidelines.

1.4 SYSTEM DESCRIPTION

- A. Duct system design, as indicated, has been used to select size and type of air-moving and -distribution equipment and other air system components. Changes to layout or configuration of duct system must be specifically approved in writing by Commissioner. Accompany requests for layout modifications with calculations showing that proposed layout will provide original design results without increasing system total pressure.

1.5 SUBMITTALS

- A. Shop Drawings: CAD-generated and drawn to 1/4 inch equals 1 foot (1:50) scale. Show fabrication and installation details for metal ducts.
1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
 2. Duct layout indicating sizes and pressure classes.
 3. Elevations of top and bottom of ducts.
 4. Dimensions of main duct runs from building grid lines.
 5. Fittings.
 6. Reinforcement and spacing.
 7. Seam and joint construction.
 8. Penetrations through fire-rated and other partitions.
 9. Equipment installation based on equipment being used on Project.
 10. Duct accessories, including access doors and panels.
 11. Hangers and supports, including methods for duct and building attachment, vibration isolation, and seismic restraints.
- B. Coordination Drawings: Reflected ceiling plans, 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. Ceiling suspension assembly members.
 2. Other systems installed in same space as ducts.
 3. Ceiling- and wall-mounting access doors and panels required to provide access to dampers and other operating devices.
 4. Ceiling-mounting items, including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
- C. Welding certificates.
- D. Field quality-control test reports.

1.6 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel," for hangers and supports, AWS D1.2, "Structural Welding Code--Aluminum," for aluminum supporting members, and AWS D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.
- B. NFPA Compliance:
1. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
 2. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
- C. Comply with NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations," Ch. 3, "Duct System," for range hood ducts, unless otherwise indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified, or approved equal.

2.2 SHEET METAL MATERIALS

- A. 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 shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
- B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G90 (Z275) coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.
- C. Carbon-Steel Sheets: ASTM A 366/A 366M, cold-rolled sheets; commercial quality; with oiled, matte finish for exposed ducts. 10 gauge for commercial kitchen exhaust.
- D. Stainless Steel: ASTM A 480/A 480M, Type 316, and having a No. 2D finish for concealed ducts and for exposed ducts.
- E. Aluminum Sheets: ASTM B 209 (ASTM B 209M), alloy 3003, temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.
- F. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts.
- G. Tie Rods: Galvanized steel, 1/4-inch (6-mm) minimum diameter for lengths 36 inches (900 mm) or less; 3/8-inch (10-mm) minimum diameter for lengths longer than 36 inches (900 mm).

2.3 DUCT LINER

- A. Fibrous-Glass Liner: Comply with NFPA 90A or NFPA 90B and with NAIMA AH124.
 - 1. Manufacturers:
 - a. CertainTeed Corp.; Insulation Group.
 - b. Johns Manville International, Inc.
 - c. Knauf Fiber Glass GmbH.
 - d. Owens Corning.

2. Materials: ASTM C 1071; surfaces exposed to airstream shall be coated to prevent erosion of glass fibers.
 - a. Thickness: 1 inch (25 mm).
 - b. Thermal Conductivity (k-Value): 0.26 at 75 deg F (0.037 at 24 deg C) mean temperature.
 - c. Fire-Hazard Classification: Maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.
 - d. Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.
 - e. Mechanical Fasteners: Galvanized steel suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in duct.
 - 1) Tensile Strength: Indefinitely sustain a 50-lb- (23-kg-) tensile, dead-load test perpendicular to duct wall.
 - 2) Fastener Pin Length: As required for thickness of insulation and without projecting more than 1/8 inch (3 mm) into airstream.
 - 3) Adhesive for Attaching Mechanical Fasteners: Comply with fire-hazard classification of duct liner system.

2.4 SEALANT MATERIALS

- A. Water-Based Joint and Seam Sealant: Flexible, adhesive sealant, resistant to UV light when cured, UL 723 listed, and complying with NFPA requirements for Class 1 ducts.
- B. Solvent-Based Joint and Seam Sealant: One-part, nonsag, solvent-release-curing, polymerized butyl sealant formulated with a minimum of 75 percent solids.
- C. Flanged Joint Mastic: One-part, acid-curing, silicone, elastomeric joint sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use O.
- D. Flange Gaskets: Butyl rubber or EPDM polymer with polyisobutylene plasticizer.

2.5 HANGERS AND SUPPORTS

- A. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 1. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches (100 mm) thick.
 2. Exception: Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches (100 mm) thick.
- B. Hanger Materials: Galvanized sheet steel or threaded steel rod.

1. Hangers Installed in Corrosive Atmospheres: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
 2. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for steel sheet width and thickness and for steel rod diameters.
 3. Galvanized-steel straps attached to aluminum ducts shall have contact surfaces painted with zinc-chromate primer.
- C. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- D. Trapeze and Riser Supports: Steel shapes complying with ASTM A 36/A 36M.
1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
 2. Supports for Stainless-Steel Ducts: Stainless-steel support materials.
 3. Supports for Aluminum Ducts: Aluminum support materials unless materials are electrolytically separated from ducts.

2.6 RECTANGULAR DUCT FABRICATION

- A. Fabricate ducts, elbows, transitions, offsets, branch connections, and other construction according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" and complying with requirements for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.
1. Lengths: Fabricate rectangular ducts in lengths appropriate to reinforcement and rigidity class required for pressure class.
 2. Deflection: Duct systems shall not exceed deflection limits according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- B. Transverse Joints: Prefabricated slide-on joints and components constructed using manufacturer's guidelines for material thickness, reinforcement size and spacing, and joint reinforcement.
1. Manufacturers:
 - a. Ductmate Industries, Inc.
 - b. Nexus Inc.
 - c. Ward Industries, Inc.
- C. Formed-On Flanges: Construct according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," Figure 1-4, using corner, bolt, cleat, and gasket details.
1. Manufacturers:
 - a. Ductmate Industries, Inc.
 - b. Lockformer.
 - c. Ward Industries, Inc.

2. Duct Size: Maximum 30 inches (750 mm) wide and up to 2-inch wg (500-Pa) pressure class.
 3. Longitudinal Seams: Pittsburgh lock sealed with noncuring polymer sealant.
- D. Cross Breaking or Cross Beading: Cross break or cross bead duct sides 19 inches (480 mm) and larger and 0.0359 inch (0.9 mm) thick or less, with more than 10 sq. ft. (0.93 sq. m) of nonbraced panel area unless ducts are lined.

2.7 APPLICATION OF LINER IN RECTANGULAR DUCTS

- A. Adhere a single layer of indicated thickness of duct liner with 100 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
- B. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
- C. Butt transverse joints without gaps and coat joint with adhesive.
- D. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
- E. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and standard liner product dimensions make longitudinal joints necessary.
- F. Apply adhesive coating on longitudinal seams in ducts with air velocity of 2500 fpm (12.7 m/s).
- G. Secure liner with mechanical fasteners 4 inches (100 mm) from corners and at intervals not exceeding 12 inches (300 mm) transversely; at 3 inches (75 mm) from transverse joints and at intervals not exceeding 18 inches (450 mm) longitudinally.
- H. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:
 1. Fan discharges.
 2. Intervals of lined duct preceding unlined duct.
 3. Upstream edges of transverse joints in ducts where air velocities are greater than 2500 fpm (12.7 m/s) or where indicated.
- I. Secure insulation between perforated sheet metal inner duct of same thickness as specified for outer shell. Use mechanical fasteners that maintain inner duct at uniform distance from outer shell without compressing insulation.
 1. Sheet Metal Inner Duct Perforations: 3/32-inch (2.4-mm) diameter, with an overall open area of 23 percent.

- J. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.

2.8 ROUND DUCT AND FITTING FABRICATION

- A. Round, Spiral Lock-Seam Ducts: Fabricate supply ducts of galvanized steel according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
- B. Duct Joints:
 - 1. Ducts up to 20 Inches (500 mm) in Diameter: Three-piece, gasketed, flanged joint consisting of two internal flanges with sealant and one external closure band with gasket.
 - 2. Round Ducts: Prefabricated connection system consisting of double-lipped, EPDM rubber gasket. Manufacture ducts according to connection system manufacturer's tolerances.
- C. 90-Degree Tees and Laterals and Conical Tees: Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," with metal thicknesses specified for longitudinal-seam straight ducts.
- D. Diverging-Flow Fittings: Fabricate with reduced entrance to branch taps and with no excess material projecting from fitting onto branch tap entrance.
- E. Fabricate elbows using die-formed, gored, pleated, or mitered construction. Bend radius of die-formed, gored, and pleated elbows shall be 1-1/2 times duct diameter. Unless elbow construction type is indicated, fabricate elbows as follows:
 - 1. Mitered-Elbow Radius and Number of Pieces: Welded construction complying with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible," unless otherwise indicated.
 - 2. Round Mitered Elbows: Welded construction with the following metal thickness for pressure classes from 2- to 10-inch wg (500 to 2500 Pa): Ducts 3 to 26 Inches (75 to 660 mm) in Diameter: 0.034 inch (0.85 mm).
 - 3. 90-Degree, 2-Piece, Mitered Elbows: Use only for supply systems or for material-handling Class A or B exhaust systems and only where space restrictions do not permit using radius elbows. Fabricate with single-thickness turning vanes.
 - 4. Round Elbows: 14 Inches (225 through 355 mm) and Less in Diameter: Fabricate gored or pleated elbows for 30, 45, 60, and 90 degrees unless space restrictions require mitered elbows. Fabricate nonstandard bend-angle configurations or nonstandard diameter elbows with gored construction.
 - 5. Round Elbows Larger Than 14 Inches (355 mm) in Diameter: Fabricate gored elbows unless space restrictions require mitered elbows.

PART 3 - EXECUTION

3.1 DUCT APPLICATIONS

A. Static-Pressure Classes: Unless otherwise indicated, construct ducts according to the following:

1. Supply Ducts: 2-inch wg (500 Pa).
2. Supply Ducts (before Air Terminal Units): 2-inch wg (500 Pa).
3. Supply Ducts (after Air Terminal Units): 1-inch wg (250 Pa).
4. Supply Ducts (in Mechanical Equipment Rooms): 2-inch wg (500 Pa).
5. Return Ducts (Negative Pressure): 1-inch wg (250 Pa).
6. Exhaust Ducts (Negative Pressure): 1-inch wg (250 Pa).
7. Engine Exhaust Ducts (Negative Pressure): 10-inch wg (2500 Pa).

B. All ducts shall be galvanized steel except as follows:

1. Range Hood Exhaust Ducts: Comply with NFPA 96.
 - a. Concealed and exposed: Carbon-steel sheet, 10 gauge minimum.
 - b. Weld and flange seams and joints.
2. Toilet and shower room Exhaust Ducts:
 - a. Aluminum, with seams and laps arranged on top of duct.

3.2 DUCT INSTALLATION

- A. Construct and install ducts according to SMACNA's "HVAC Duct Construction Standards-- Metal and Flexible," unless otherwise indicated.
- B. Install round ducts in lengths not less than 12 feet (3.7 m) unless interrupted by fittings.
- C. Install ducts with fewest possible joints.
- D. Install fabricated fittings for changes in directions, size, and shape and for connections.
- E. Install couplings tight to duct wall surface with a minimum of projections into duct. Secure couplings with sheet metal screws. Install screws at intervals of 12 inches (300 mm), with a minimum of 3 screws in each coupling.
- F. Install ducts, unless otherwise indicated, vertically and horizontally and parallel and perpendicular to building lines; avoid diagonal runs.
- G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- H. Install ducts with a clearance of 1 inch (25 mm), plus allowance for insulation thickness.

- I. Conceal ducts from view in finished spaces. Do not encase horizontal runs in solid partitions unless specifically indicated.
- J. Coordinate layout with suspended ceiling, fire- and smoke-control dampers, lighting layouts, and similar finished work.
- K. Seal all joints and seams. Apply sealant to male end connectors before insertion, and afterward to cover entire joint and sheet metal screws.
- L. Electrical Equipment Spaces: Route ducts to avoid passing through transformer vaults and electrical equipment spaces and enclosures.
- M. Non-Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls and are exposed to view, conceal spaces between construction openings and ducts or duct insulation with sheet metal flanges of same metal thickness as ducts. Overlap openings on 4 sides by at least 1-1/2 inches (38 mm).
- N. Fire-Rated Partition Penetrations: Where ducts pass through interior partitions and exterior walls, install appropriately rated fire dampers, sleeves, and firestopping sealant. Fire and smoke dampers are specified in Section "Duct Accessories."
- O. Install ducts with hangers and braces designed to withstand, without damage to equipment, seismic force required by applicable building codes. Refer to SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems."
- P. Protect duct interiors from the elements and foreign materials until building is enclosed. Follow SMACNA's "Duct Cleanliness for New Construction."
- Q. Paint interiors of metal ducts, that do not have duct liner, for 24 inches (600 mm) upstream of registers and grilles. Apply one coat of flat, black, latex finish coat over a compatible galvanized-steel primer. Paint materials and application requirements are specified in painting Sections.

3.3 RANGE HOOD EXHAUST DUCTS, SPECIAL INSTALLATION REQUIREMENTS

- A. Install ducts to allow for thermal expansion through 2000 deg F (1110 deg C) temperature range.
- B. Install ducts without dips or traps that may collect residues unless traps have continuous or automatic residue removal.
- C. Install access openings at each change in direction and at intervals defined by NFPA 96; locate on sides of duct a minimum of 1-1/2 inches (38 mm) from bottom; and fit with grease-tight covers of same material as duct.
- D. Do not penetrate fire-rated assemblies except as permitted by applicable building codes.

3.4 SEAM AND JOINT SEALING

- A. Seal duct seams and joints according to SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for duct pressure class indicated.
 - 1. For pressure classes lower than 2-inch wg (500 Pa), seal transverse joints.
- B. Seal ducts before external insulation is applied.

3.5 HANGING AND SUPPORTING

- A. Support horizontal ducts within 24 inches (600 mm) of each elbow and within 48 inches (1200 mm) of each branch intersection.
- B. Support vertical ducts at maximum intervals of 16 feet (5 m) and at each floor.
- C. Install upper attachments to structures with an allowable load not exceeding one-fourth of failure (proof-test) load.
- D. Install concrete inserts before placing concrete.
- E. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 - 1. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches (100 mm) thick.

3.6 CONNECTIONS

- A. Make connections to equipment with flexible connectors according to Section "Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.7 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections according to SMACNA's "HVAC Air Duct Leakage Test Manual" and prepare test reports:
 - 1. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
 - 2. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If pressure classes are not indicated, test entire system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure. Give seven days' advance notice for testing.

3. Maximum Allowable Leakage: Comply with requirements for Leakage Class 3 for round, Leakage Class 12 for rectangular ducts in pressure classes lower than and equal to 2-inch wg (500 Pa) (both positive and negative pressures), and Leakage Class 6 for pressure classes from 2- to 10-inch wg (500 to 2500 Pa).
4. Remake leaking joints and retest until leakage is equal to or less than maximum allowable.

3.8 CLEANING NEW SYSTEMS

- A. Mark position of dampers and air-directional mechanical devices before cleaning, and perform cleaning before air balancing.
- B. Use service openings, as required, for physical and mechanical entry and for inspection.
 1. Create other openings to comply with duct standards.
 2. Disconnect flexible ducts as needed for cleaning and inspection.
 3. Remove and reinstall ceiling sections to gain access during the cleaning process.
- C. Vent vacuuming system to the outside. Include filtration to contain debris removed from HVAC systems, and locate exhaust down wind and away from air intakes and other points of entry into building.
- D. Clean the following metal duct systems 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, and actuators except in ceiling plenums and mechanical equipment rooms.
 6. Supply-air ducts, dampers, actuators, and turning vanes.
- E. 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.

5. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.

F. Cleanliness Verification:

1. Visually inspect metal ducts for contaminants.
2. Where contaminants are discovered, re-clean and reinspect ducts.

END OF SECTION 23 31 13

SECTION 233300

DUCT ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Volume dampers.
 - 2. Cord operated volume dampers.
 - 3. Motorized control dampers.
 - 4. Fire dampers.
 - 5. Smoke dampers.
 - 6. Combination fire and smoke dampers.
 - 7. Turning vanes.
 - 8. Duct-mounting access doors.
 - 9. Flexible connectors.
 - 10. Duct accessory hardware.
- B. Related Sections include the following:
 - 1. Section "HVAC Instrumentation and Controls" for electric damper actuators.

1.3 SUBMITTALS

- A. Product Data: For the following:
 - 1. Volume dampers.
 - 2. Motorized control dampers.
 - 3. Fire dampers.
 - 4. Smoke dampers.
 - 5. Combination fire and smoke dampers.
 - 6. Turning vanes.
 - 7. Duct-mounting access doors.
 - 8. Flexible connectors.

- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
1. Special fittings.
 2. Manual-volume damper installations.
 3. Motorized-control damper installations.
 4. Fire-damper, smoke-damper, and combination fire- and smoke-damper installations, including sleeves and duct-mounting access doors.
 5. Wiring Diagrams: Power, signal, and control wiring.
- C. Coordination Drawings: Reflected ceiling plans, drawn to scale and coordinating penetrations and ceiling-mounting items. Show ceiling-mounting access panels and access doors required for access to duct accessories.

1.4 QUALITY ASSURANCE

- A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

1.5 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Fusible Links: Furnish quantity equal to 10 percent of amount installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified, or approved equal.

2.2 SHEET METAL MATERIALS

- A. Comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods, unless otherwise indicated.

- B. Galvanized Sheet Steel: Lock-forming quality; complying with ASTM A 653/A 653M and having G90 (Z275) coating designation; ducts shall have mill-phosphatized finish for surfaces exposed to view.
- C. Stainless Steel: ASTM A 480/A 480M.
- D. Aluminum Sheets: ASTM B 209 (ASTM B 209M), alloy 3003, temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.
- E. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

2.3 VOLUME DAMPERS (accessible locations only)

A. Manufacturers:

1. Air Balance, Inc.
2. American Warming and Ventilating.
3. McGill AirFlow Corporation.
4. METALAIRE, Inc.
5. Nailor Industries Inc.
6. Ruskin Company.

- B. General Description: Factory fabricated, with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class. End bearings or other seals for ducts with axles full length of damper blades and bearings at both ends of operating shaft.

- C. Low-Leakage Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, low-leakage rating, with linkage outside airstream, and suitable for horizontal or vertical applications.

1. Steel Frames: Angle-shaped, galvanized sheet steel channels, minimum of 0.064 inch (1.62 mm) thick, with mitered and welded corners; frames with flanges where indicated for attaching to walls and flangeless frames where indicated for installing in ducts.
2. Roll-Formed Steel Blades: 0.064-inch- (1.62-mm-) thick, galvanized sheet steel.
3. Aluminum Frames: Angle-shaped, 0.10-inch- (2.5-mm-) thick, aluminum sheet channels; frames with flanges where indicated for attaching to walls and flangeless frames where indicated for installing in ducts.
4. Roll-Formed Aluminum Blades: 0.10-inch- (2.5-mm-) thick aluminum sheet.
5. Blade Axles: Stainless steel.
6. Bearings: Oil-impregnated bronze thrust or ball.
7. Blade Seals: Neoprene.
8. Jamb Seals: Cambered aluminum.
9. Tie Bars and Brackets: Galvanized steel.

- D. Jackshaft: 1-inch- (25-mm-) diameter, galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies. Length and Number of Mountings: Appropriate to connect linkage of each damper in multiple-damper assembly.
- E. Damper Hardware: Zinc-plated, die-cast core with dial and handle made of 3/32-inch- (2.4-mm-) thick zinc-plated steel, and a 3/4-inch (19-mm) hexagon locking nut. Include center hole to suit damper operating-rod size. Include elevated platform for insulated duct mounting.

2.4 CORD OPERATED VOLUME DAMPERS (inaccessible locations and drywall ceilings)

- A. Manufacturers:
 - 1. McGill AirFlow Corporation.
 - 2. METALAIRE, Inc.
 - 3. Nailor Industries Inc.
 - 4. Ruskin Company.
 - 5. Young Regulator.
- B. General Description: Damper controller and cable shall be concealed above the ceiling. Cable shall consist of Bowden cable 0.054" stainless steel control wire encapsulated in 1/16" flexible galvanized spiral wire sheath. Control kit shall consist of 2-5/8" diameter die-cast aluminum housing with 3" diameter chrome plate and 14 gauge steel rack and pinion gear drive. Control shaft shall be D-style flatted 1/4" diameter with 265 degree rotation providing graduations for positive locking and control. Control kit shall be designed to be mounted flush in the ceiling finished surface. Factory fabricated, with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.
 - 1. Pressure Classes of 3-Inch wg (750 Pa) or Higher: End bearings or other seals for ducts with axles full length of damper blades and bearings at both ends of operating shaft.
- C. Low-Leakage Volume Dampers: Multiple- or single-blade, parallel- or opposed-blade design as indicated, low-leakage rating, with linkage outside airstream, and suitable for horizontal or vertical applications.
 - 1. Steel Frames: Hat-shaped, galvanized sheet steel channels, minimum of 0.064 inch (1.62 mm) thick, with mitered and welded corners for square duct and galvanized spiral steel shell for round duct; frames with flanges where indicated for attaching to walls and flangeless frames where indicated for installing in ducts.
 - 2. Roll-Formed Steel Blades: 20 gauge thick, galvanized sheet steel.
 - 3. Blade Axles: Stainless steel.
 - 4. Bearings: Oil-impregnated bronze thrust or ball.
 - 5. Blade Seals: Neoprene.
 - 6. Jamb Seals: Cambered stainless steel.
 - 7. Tie Bars and Brackets: Galvanized steel.

- D. Jackshaft: 1-inch- (25-mm-) diameter, galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
 - 1. Length and Number of Mountings: Appropriate to connect linkage of each damper in multiple-damper assembly.
- E. Damper Hardware: Provide all necessary hardware for cable control system, including but not limited to, wrenches, control kits, minimum 5 foot length of cable per damper, tamper proof kits in all animal holding areas, controllers, and diffuser or register mounting kits as required for a complete and clean finished appearance.

2.5 MOTORIZED CONTROL DAMPERS

A. Manufacturers:

- 1. Air Balance, Inc.
- 2. American Warming and Ventilating.
- 3. Duro Dyne Corp.
- 4. McGill AirFlow Corporation.
- 5. METALAIRE, Inc.
- 6. Nailor Industries Inc.
- 7. Ruskin Company.
- 8. Vent Products Company, Inc.

- B. General Description: AMCA-rated, opposed-blade design; minimum of 0.1084-inch- (2.8-mm-) thick, galvanized-steel frames with holes for duct mounting; minimum of 0.0635-inch- (1.61-mm-) thick, galvanized-steel damper blades with maximum blade width of 8 inches (203 mm).

- 1. Secure blades to 1/2-inch- (13-mm-) diameter, zinc-plated axles using zinc-plated hardware, with nylon blade bearings, blade-linkage hardware of zinc-plated steel and brass, ends sealed against spring-stainless-steel blade bearings, and thrust bearings at each end of every blade.
- 2. Operating Temperature Range: From minus 40 to plus 200 deg F (minus 40 to plus 93 deg C).
- 3. Provide opposed-blade design with inflatable seal blade edging, or replaceable rubber seals, rated for leakage at less than 10 cfm per sq. ft. (51 L/s per sq. m) of damper area, at differential pressure of 4-inch wg (995 Pa) when damper is being held by torque of 50 in. x lbf (5.6 N x m); when tested according to AMCA 500D.

2.6 FIRE DAMPERS

A. Manufacturers:

- 1. Air Balance, Inc.
- 2. McGill AirFlow Corporation.
- 3. METALAIRE, Inc.
- 4. Nailor Industries Inc.

5. Penn Ventilation Company, Inc.
 6. Prefco Products, Inc.
 7. Ruskin Company.
 8. Vent Products Company, Inc.
 9. Ward Industries, Inc.
- B. Fire dampers shall be labeled according to UL 555.
- C. Fire Rating: 1-1/2 hours.
- D. Frame: Curtain type with blades outside airstream; fabricated with roll-formed, 0.034-inch- (0.85-mm-) thick galvanized steel; with mitered and interlocking corners.
- E. Mounting Sleeve: field-installed, sheet steel. Minimum Thickness: 14 gauge minimum.
- F. Mounting Orientation: Vertical or horizontal as indicated.
- G. Blades: Roll-formed, interlocking, 0.034-inch- (0.85-mm-) thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch- (0.85-mm-) thick, galvanized-steel blade connectors.
- H. Include blade lock and stainless-steel closure spring.
- I. Fusible Links: Replaceable, 165 deg F (74 deg C) rated.

2.7 COMBINATION FIRE AND SMOKE DAMPERS

- A. Manufacturers:
1. Air Balance, Inc.
 2. Nailor Industries Inc.
 3. Penn Ventilation Company, Inc.
 4. Ruskin Company.
- B. General Description: Labeled according to UL 555S. Combination fire and smoke dampers shall be labeled according to UL 555S for 1-1/2-hour rating.
- C. Fusible Links: Replaceable, 212 deg F (100 deg C) rated (applies to all fire smoke dampers).
- D. Frame and Blades: 0.064-inch- (1.62-mm-) thick, galvanized sheet steel.
- E. Include blade lock and stainless-steel closure spring.
- F. Mounting Sleeve: Mounting Sleeve: field-installed, sheet steel. Minimum Thickness: 14 gauge minimum sheet steel.
- G. Damper Motors: Modulating action (for use in smoke exhaust systems and in non-smoke exhaust systems).

1. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains.
 2. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of 150 in. x lbf (17 N x m) and breakaway torque rating of 150 in. x lbf (17 N x m).
 3. Outdoor Motors and Motors in Outside-Air Intakes: Equip with O-ring gaskets designed to make motors weatherproof. Equip motors with internal heaters to permit normal operation at minus 40 deg F (minus 40 deg C).
 4. Electrical Connection: 115 V, single phase, 60 Hz.
 5. Fire smoke dampers that are installed in smoke exhaust systems shall have the capability of being opened remotely via a signal from the key-operated smoke control switch. Refer to the drawings for notes and detail and refer to section 15940 for specific sequence of operation requirements. Each fire and smoke damper shall be provide with end switches and control relays to achieve the appropriate function.
- H. Pilot lights to be mounted in visible locations:
1. Provide, for each fire and smoke damper, local pilot lights hardwired to the dampers' end switches that will illuminate when the fire and smoke damper is opened.
 2. The pilot light shall not illuminate if the fire and smoke damper does not open due to either failure or if the associated air system is in the "off" mode.
 3. Each pilot light shall be labeled "Fire Smoke Damper."

2.8 TURNING VANES

- A. Fabricate to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for vanes and vane runners. Vane runners shall automatically align vanes.
- B. Manufactured Turning Vanes: Fabricate 1-1/2-inch- (38-mm-) wide, double-vane, curved blades of galvanized sheet steel set 3/4 inch (19 mm) o.c.; support with bars perpendicular to blades set 2 inches (50 mm) o.c.; and set into vane runners suitable for duct mounting.
1. Manufacturers:
 - a. Ductmate Industries, Inc.
 - b. Duro Dyne Corp.
 - c. METALAIRE, Inc.
 - d. Ward Industries, Inc.

2.9 DUCT-MOUNTING ACCESS DOORS

- A. General Description: Fabricate doors airtight and suitable for duct pressure class.
- B. Door: Double wall, duct mounting, and rectangular; fabricated of galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class. Include vision panel where indicated. Include 1-by-1-inch (25-by-25-mm) butt or piano hinge and cam latches.

1. Manufacturers:

- a. American Warming and Ventilating.
- b. Ductmate Industries, Inc.
- c. Flexmaster U.S.A., Inc.
- d. McGill AirFlow Corporation.
- e. Nailor Industries Inc.
- f. Ventfabrics, Inc.
- g. Ward Industries, Inc.

2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.

3. Provide number of hinges and locks as follows:

- a. Less Than 12 Inches (300 mm) Square: Secure with two sash locks.
- b. Up to 18 Inches (450 mm) Square: Two hinges and two sash locks.
- c. Up to 24 by 48 Inches (600 by 1200 mm): Three hinges and two compression latches with outside and inside handles.
- d. Sizes 24 by 48 Inches (600 by 1200 mm) and Larger: One additional hinge.

C. Seal around frame attachment to duct and door to frame with neoprene or foam rubber.

2.10 FLEXIBLE CONNECTORS

A. Manufacturers:

1. Ductmate Industries, Inc.
2. Duro Dyne Corp.
3. Ventfabrics, Inc.
4. Ward Industries, Inc.

B. General Description: Flame-retardant or noncombustible fabrics, coatings, and adhesives complying with UL 181, Class 1.

C. Metal-Edged Connectors: Factory fabricated with a fabric strip 5-3/4 inches (146 mm) wide attached to two strips of 2-3/4-inch- (70-mm-) wide, 0.028-inch- (0.7-mm-) thick, galvanized sheet steel or 0.032-inch- (0.8-mm-) thick aluminum sheets. Select metal compatible with ducts.

D. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.

1. Minimum Weight: 26 oz./sq. yd. (880 g/sq. m).
2. Tensile Strength: 480 lbf/inch (84 N/mm) in the warp and 360 lbf/inch (63 N/mm) in the filling.
3. Service Temperature: Minus 40 to plus 200 deg F (Minus 40 to plus 93 deg C).

E. 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. (810 g/sq. m).
 2. Tensile Strength: 530 lbf/inch (93 N/mm) in the warp and 440 lbf/inch (77 N/mm) in the filling.
 3. Service Temperature: Minus 50 to plus 250 deg F (Minus 45 to plus 121 deg C).
- F. High-Temperature System, Flexible Connectors: Glass fabric coated with silicone rubber.
1. Minimum Weight: 16 oz./sq. yd. (542 g/sq. m).
 2. Tensile Strength: 285 lbf/inch (50 N/mm) in the warp and 185 lbf/inch (32 N/mm) in the filling.
 3. Service Temperature: Minus 67 to plus 500 deg F (Minus 55 to plus 260 deg C).
- G. High-Corrosive-Environment System, Flexible Connectors: Glass fabric with chemical-resistant coating.
1. Minimum Weight: 14 oz./sq. yd. (474 g/sq. m).
 2. Tensile Strength: 450 lbf/inch (79 N/mm) in the warp and 340 lbf/inch (60 N/mm) in the filling.
 3. Service Temperature: Minus 67 to plus 500 deg F (Minus 55 to plus 260 deg C).
- 2.11 DUCT ACCESSORY HARDWARE
- A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct insulation thickness.
 - B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 APPLICATION AND INSTALLATION

- A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards--Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
- B. Provide 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. Install volume dampers in ducts with liner; avoid damage to and erosion of duct liner.
- D. Provide balancing dampers at points on supply, return, and exhaust systems where branches lead from larger ducts as required for air balancing. Install at a minimum of two duct widths from branch takeoff.

- E. Provide test holes at fan inlets and outlets and elsewhere as indicated.
- F. Install fire and smoke dampers, with fusible links, according to manufacturer's UL-approved written instructions.
- G. Install duct access doors to allow for inspecting, adjusting, and maintaining accessories and terminal units as follows:
 - 1. On both sides of duct coils.
 - 2. Downstream from volume dampers, turning vanes, and equipment.
 - 3. Adjacent to fire or fire/smoke dampers, providing access to reset or reinstall fusible links.
 - 4. To interior of ducts for cleaning; before and after each change in direction, at maximum 50-foot (15-m) spacing.
 - 5. On sides of ducts where adequate clearance is available.
- H. Install the following sizes for duct-mounting, rectangular access doors:
 - 1. Head and Hand Access: 18 by 10 inches (460 by 250 mm).
 - 2. Head and Shoulders Access: 21 by 14 inches (530 by 355 mm).
 - 3. Body Access: 25 by 14 inches (635 by 355 mm).
 - 4. Body Plus Ladder Access: 25 by 17 inches (635 by 430 mm).
- I. Label access doors.
- J. Install flexible connectors immediately adjacent to equipment in ducts associated with fans and motorized equipment supported by vibration isolators.
- K. For fans developing static pressures of 5-inch wg (1250 Pa) and higher, cover flexible connectors with loaded vinyl sheet held in place with metal straps.
- L. Install duct test holes where indicated and required for testing and balancing purposes.

3.2 ADJUSTING

- A. Adjust duct accessories for proper settings.
- B. Adjust fire and smoke dampers for proper action.
- C. Final positioning of manual-volume dampers is specified in Section "Testing, Adjusting, and Balancing."

END OF SECTION 23 33 00

SECTION 233413

AXIAL FANS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Tubeaxial fans.

1.3 PERFORMANCE REQUIREMENTS

- A. Project Altitude: Base fan performance ratings on actual Project site elevations above sea level.
- B. Operating Limits: Classify according to AMCA 99.

1.4 SUBMITTALS

- A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated and include the following:
 - 1. Certified fan performance curves with system operating conditions indicated.
 - 2. Certified fan sound-power ratings.
 - 3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
 - 4. Material thickness and finishes, including color charts.
 - 5. Dampers, including housings, linkages, and operators.
 - 6. Fan speed controllers.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 1. Wiring Diagrams: Power, signal, and control wiring.
 - 2. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.

3. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, and base weights.
 - C. Coordination Drawings: Show fan room layout and relationships between components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Indicate and certify field measurements.
 - D. Field quality-control test reports.
 - E. Operation and Maintenance Data: For axial fans to include in emergency, operation, and maintenance manuals.
- 1.5 QUALITY ASSURANCE
- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - B. AMCA Compliance: Products shall comply with performance requirements and shall be licensed to use the AMCA-Certified Ratings Seal.
 - C. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Deliver fans as factory-assembled units, to the extent allowable by shipping limitations, with protective crating and covering.
 - B. Disassemble and reassemble units, as required for moving to final locations, according to manufacturer's written instructions.
 - C. Lift and support units with manufacturer's designated lifting or supporting points.
- 1.7 COORDINATION
- A. Coordinate size and location of structural-steel support members.
 - B. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases.
 - C. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace components listed below that fail in materials or workmanship within specified warranty period.
1. Warranty Period: Manufacturer's standard, but not less than 5 years from date of Substantial Completion.

1.9 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Belts: One set(s) for each belt-driven unit.

PART 2 - PRODUCTS

2.1 TUBEAXIAL FANS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
1. Loren Cook Company.
 2. Greenheck.
 3. Cincinnati Fan.
 4. New Philadelphia Fan Co.
- B. Description: Fan wheel and housing, factory-mounted motor with belt drive, an inlet cone section, and accessories.
- C. Housings: Stainless steel.
- D. Wheel Assemblies: Cast or extruded aluminum with airfoil-shaped blades mounted on cast-iron wheel plate keyed to shaft with solid-steel key.
- E. Drives: Factory mounted, with final alignment and belt adjustment made after installation.
1. Service Factor Based on Fan Motor Size: 1.5.
 2. Fan Shaft: Turned, ground, and polished steel designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.
 3. Fan Pulleys: Cast iron with split, tapered bushing; dynamically balanced at factory.
 4. Motor Pulleys: Adjustable pitch. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
 5. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
 6. Belt Guards: Fabricate of steel for motors mounted on outside of fan cabinet.
 7. Motor Mount: Adjustable base.
 8. Shaft Bearings: Radial, self-aligning ball or roller bearings.

- a. Roller-Bearing Rating Life: ABMA 11, L10 of 100,000 hours.
- b. Extend lubrication lines to outside of casing and terminate with grease fittings.

F. Accessories:

1. Companion Flanges: Rolled flanges of same material as housing.
2. Inspection Door: Bolted door allowing limited access to internal parts of fan, of same material as housing.
3. Propeller Access Section Door.
4. Swingout Construction: Assembly allowing entire fan section to swing out from duct for cleaning and servicing, of same material as housing.
5. Mounting Clips: Vertical mounting clips welded to fan housing.
6. Vertical Support: Short duct section with welded brackets bolted to fan housing.
7. Inlet and Outlet Screens: Wire-mesh screen on fans not connected to ductwork, of same material as housing.
8. Backdraft Dampers: Butterfly style.
9. Shaft Seal: Elastomeric seal and Teflon wear plate, suitable for up to 300 deg F (149 deg C).
10. Motor Cover: Cover with side vents to dissipate motor heat, of same material as housing.
11. Inlet Vanes: Adjustable; with peripheral control linkage operated from outside of airstream, bronze sleeve bearings on each end of vane support, and provision for manual or automatic operation of same material as housing.
12. Inlet Cones: Round-to-round transition of same material as housing.
13. Stack Cap: Vertical discharge assembly with backdraft dampers, of same material as housing.

G. Motors: Enclosure Type: Totally enclosed, fan cooled.

H. Factory Finishes:

1. Sheet Metal Parts: Prime coat before final assembly.
2. Exterior Surfaces: Baked-enamel finish coat after assembly.
3. Coatings: Epoxy. Apply to finished housings and fan wheels.

I. Capacities and Characteristics: refer to plan schedules for additional information.

1. Drive Type: Belt.
2. Vibration Isolators: Restrained curb, minimum 12" high having a static deflection of 1 inch (25 mm).

2.2 SOURCE QUALITY CONTROL

- A. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.
- B. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install axial fans level and plumb.
- B. Install wind and seismic restraints according to manufacturer's written instructions.
- C. Install units with clearances for service and maintenance.
- D. Label fans according to requirements specified.

3.2 CONNECTIONS

- A. Duct installation and connection requirements are specified in other Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors.
- B. Ground equipment according to Division 26.
- C. Connect wiring according to Division 26.

3.3 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. Verify that shipping, blocking, and bracing are removed.
 - 2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
 - 3. Verify that cleaning and adjusting are complete.
 - 4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
 - 5. Adjust belt tension.
 - 6. Adjust damper linkages for proper damper operation.
 - 7. Verify lubrication for bearings and other moving parts.
 - 8. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
 - 9. Disable automatic temperature-control operators, energize motor and confirm proper motor rotation and unit operation, adjust fan to indicated rpm, and measure and record motor voltage and amperage.
 - 10. Shut unit down and reconnect automatic temperature-control operators.
 - 11. Remove and replace malfunctioning units and retest as specified above.

- B. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

- A. Adjust damper linkages for proper damper operation.
- B. Adjust belt tension.
- C. Lubricate bearings.

END OF SECTION 23 34 13

SECTION 233423

POWER VENTILATORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Centrifugal roof ventilators.

1.3 PERFORMANCE REQUIREMENTS

- A. Project Altitude: Base fan-performance ratings on actual Project site elevations.
- B. Operating Limits: Classify according to AMCA 99.

1.4 SUBMITTALS

- A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated and include the following:
 - 1. Certified fan performance curves with system operating conditions indicated.
 - 2. Certified fan sound-power ratings.
 - 3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
 - 4. Material thickness and finishes, including color charts.
 - 5. Dampers, including housings, linkages, and operators.
 - 6. Roof curbs.
 - 7. Fan speed controllers.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 1. Wiring Diagrams: Power, signal, and control wiring.

2. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
 3. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, and base weights.
- C. Coordination Drawings: Reflected ceiling plans and other details, 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. Roof framing and support members relative to duct penetrations.
- D. Field quality-control test reports.
- E. Operation and Maintenance Data: For power ventilators to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. AMCA Compliance: Products shall comply with performance requirements and shall be licensed to use the AMCA-Certified Ratings Seal.
- C. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.
- D. UL Standard: Power ventilators shall comply with UL 705.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver fans as factory-assembled unit, to the extent allowable by shipping limitations, with protective crating and covering.
- B. Disassemble and reassemble units, as required for moving to final location, according to manufacturer's written instructions.
- C. Lift and support units with manufacturer's designated lifting or supporting points.

1.7 COORDINATION

- A. Coordinate size and location of structural-steel support members.
- B. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases.

- C. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace components listed below that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Manufacturer's standard, but not less than 5 years from date of Substantial Completion.

1.9 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Belts: One set(s) for each belt-driven unit.

PART 2 - PRODUCTS

2.1 CENTRIFUGAL ROOF VENTILATORS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following, or approved equal:
 - 1. Acme Commissioning & Mfg. Corp.
 - 2. American Coolair Corp.
 - 3. Central Blower Co.
 - 4. Greenheck.
 - 5. Hartzell Fan, Inc.
 - 6. Loren Cook Company.
 - 7. Penn Ventilation.
- B. Description: Belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, curb base, and accessories.
- C. Housing: Removable, spun-aluminum, dome top and outlet baffle; square, one-piece, aluminum base with venturi inlet cone.
 - 1. Upblast Units: Provide spun-aluminum discharge baffle to direct discharge air upward, with rain and snow drains and grease collector.
 - 2. Hinged Subbase: Galvanized-steel hinged arrangement permitting service and maintenance.
- D. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.
- E. Belt-Driven Drive Assembly: Resiliently mounted to housing, with the following features:

1. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
2. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
3. Pulleys: Cast-iron, adjustable-pitch motor pulley.
4. Fan and motor isolated from exhaust airstream.

F. Accessories:

1. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted outside fan housing, factory wired through an internal aluminum conduit.
2. Bird Screens: Removable, 1/2-inch (13-mm) mesh, aluminum or brass wire.
3. Motorized Dampers: Parallel-blade dampers mounted in curb base with electric actuator; wired to close when fan stops.

G. Roof Curbs: Galvanized steel; mitered and welded corners; 1-1/2-inch- (40-mm-) thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch (40-mm) wood nailer. Size as required to suit roof opening and fan base.

1. Configuration: Built-in raised cant and mounting flange.
2. Overall Height: 12 inches (300 mm).
3. Sound Curb: Curb with sound-absorbing insulation matrix.
4. Pitch Mounting: Manufacture curb for roof slope.
5. Metal Liner: Galvanized steel.
6. Mounting Pedestal: Galvanized steel with removable access panel.
7. Vented Curb: Unlined with louvered vents in vertical sides.

H. Capacities and Characteristics: refer to plan schedules for additional requirements.

1. Drive Arrangement: Belt drive.
2. Curb Height: 12 inches.
3. Damper: Yes.

2.2 MOTORS

- A. Enclosure Type: open drip proof.

2.3 SOURCE QUALITY CONTROL

- A. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.
- B. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install power ventilators level and plumb.
- B. Secure roof-mounting fans to roof curbs with cadmium-plated hardware.
- C. Install units with clearances for service and maintenance.
- D. Label units according to requirements specified.

3.2 CONNECTIONS

- A. Duct installation and connection requirements are specified in other Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors.
- B. Install ducts adjacent to power ventilators to allow service and maintenance.
- C. Ground equipment according to Division 26.
- D. Connect wiring according to Division 26.

3.3 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. Verify that shipping, blocking, and bracing are removed.
 - 2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
 - 3. Verify that cleaning and adjusting are complete.
 - 4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
 - 5. Adjust belt tension.
 - 6. Adjust damper linkages for proper damper operation.
 - 7. Verify lubrication for bearings and other moving parts.
 - 8. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
 - 9. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.
 - 10. Shut unit down and reconnect automatic temperature-control operators.
 - 11. Remove and replace malfunctioning units and retest as specified above.

- B. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

- A. Adjust damper linkages for proper damper operation.
- B. Adjust belt tension.
- C. Refer to Section "Testing, Adjusting, and Balancing" for testing, adjusting, and balancing procedures.
- D. Replace fan and motor pulleys as required to achieve design airflow.
- E. Lubricate bearings.

END OF SECTION 23 34 23

SECTION 233713

DIFFUSERS AND REGISTERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes ceiling- and wall-mounted diffusers and registers.
- B. Related Sections include the following:
 - 1. Section "Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers and registers.

1.3 SUBMITTALS

- A. Product Data: For each product indicated, include the following:
 - 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 and Register Schedule: Indicate Drawing designation, room location, quantity, model number, size, and accessories furnished.
- B. Coordination Drawings: Reflected ceiling plans, 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. Ceiling suspension assembly members.
 - 2. Method of attaching hangers to building structure.
 - 3. Size and location of initial access modules for acoustical tile.
 - 4. Ceiling-mounted items including lighting fixtures, diffusers, speakers, sprinklers, access panels, and special moldings.
 - 5. Duct access panels.
- C. Samples for Initial Selection: For diffusers and registers with factory-applied color finishes.
- D. Samples for Verification: For diffusers and registers, in manufacturer's standard sizes to verify color selected.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified, or approved equal.

2.2 REGISTERS

A. Adjustable Bar Register:

1. Manufacturers:
 - a. Anemostat; a Mestek Company.
 - b. METALAIRE, Inc.; Metal Industries Inc.
 - c. Nailor Industries of Texas Inc.
 - d. Titus.
2. Material: Steel.
3. Finish: Baked enamel, color selected by Commissioner.
4. Face Blade Arrangement: Adjustable horizontal spaced 3/4 inch (19 mm) apart.
5. Rear Blade Arrangement: Adjustable vertical spaced [3/4 inch (19 mm) apart.
6. Frame: 1 inch (25 mm) wide.
7. Mounting: Concealed.
8. Damper Type: Adjustable opposed-blade assembly.
9. Accessories: Front-blade gang operator.

2.3 CEILING DIFFUSER OUTLETS

A. Rectangular and Square Ceiling Diffusers:

1. Manufacturers:
 - a. Anemostat; a Mestek Company.
 - b. METALAIRE, Inc.; Metal Industries Inc.
 - c. Nailor Industries of Texas Inc.
 - d. Titus.
2. Material: Steel.
3. Finish: Baked enamel, color selected by Commissioner.
4. Face Size: 24 by 24 inches (600 by 600 mm).
5. Face Style: Plaque.
6. Mounting: coordinate with Commissionerural reflected ceiling plans.
7. Pattern: Adjustable.
8. Dampers: Combination damper and grid.
9. Accessories:
 - a. Equaling grid.
 - b. Plaster ring.
 - c. Safety chain.

- d. Wire guard.
- e. Sectorizing baffles.
- f. Operating rod extension.

B. Louver Face Diffuser:

- 1. Manufacturers:
 - a. Anemostat; a Mestek Company.
 - b. METALAIRE, Inc.; Metal Industries Inc.
 - c. Nailor Industries of Texas Inc.
 - d. Titus.
- 2. Material: Steel.
- 3. Finish: Baked enamel, color selected by Commissioner.
- 4. Mounting: coordinate with Commissionerural reflected ceiling plans.
- 5. Pattern: refer to plans for core style.
- 6. Dampers: Combination damper and grid.
- 7. Accessories:
 - a. Square to round neck adaptor.
 - b. Adjustable pattern vanes.
 - c. Throw reducing vanes.
 - d. Equaling grid.
 - e. Plaster ring.
 - f. Safety chain.
 - g. Wire guard.
 - h. Sectorizing baffles.
 - i. Operating rod extension.

2.4 SOURCE QUALITY CONTROL

- A. Verification of Performance: Rate diffusers and registers according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas where diffusers and registers are to be 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.

3.2 INSTALLATION

- A. Install diffusers and registers.

- 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 practicable. For units installed in lay-in ceiling panels, locate units in the center of panel. Where Commissionerrural features or other items conflict with installation, notify Commissioner for a determination of final location.
- C. Install diffusers and registers with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

- A. After installation, adjust diffusers and registers to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 23 37 13

SECTION 234100

AIR FILTERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes factory-fabricated air-filter devices and media used to remove particulate matter from air for HVAC applications.

1.3 SUBMITTALS

- A. Product Data: Include dimensions; operating characteristics; required clearances and access; rated flow capacity, including initial and final pressure drop at rated airflow; efficiency and test method; fire classification; furnished specialties; and accessories for each model indicated.
- B. Shop Drawings: Include plans, elevations, sections, and details to illustrate component assemblies and attachments.
 - 1. Show assembly, dimensions, materials, and methods of assembly of components.
 - 2. Include drawings and requirements for installing filters.
- C. Operation and Maintenance Data: For each type of filter and rack to include in emergency, operation, and maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Product: Drawings indicate size, profiles, and dimensional requirements of air filters and are based on the specific system indicated. Refer to General Conditions Section "Product Requirements."
- B. Comply with ARI 850.
- C. Comply with ASHRAE 52.1 and ASHRAE 52.2 for method of testing and rating air-filter units.
- D. Comply with NFPA 90A and NFPA 90B.

1.5 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Provide one complete set of filters for each filter bank. If system includes prefilters, provide only prefilters.
 2. Provide one container of red oil for inclined manometer filter gage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
1. Air Filters and Filter-Holding Systems:
 - a. AAF International.
 - b. Farr Co.
 - c. Purafil, Inc.
 2. Filter Gages:
 - a. Airguard Industries, Inc.
 - b. AAF International.
 - c. Dwyer Instruments, Inc.

2.2 EXTENDED-SURFACE, DISPOSABLE PANEL FILTERS

- A. Description: Factory-fabricated, dry, extended-surface filters with holding frames.
- B. Media: Fibrous material formed into deep-V-shaped pleats with anti-microbial agent and held by self-supporting wire grid.
- C. Media Frame: Galvanized steel.
- D. Duct-Mounting Frames: Welded, galvanized steel with gaskets and fasteners, and suitable for bolting together into built-up filter banks.

2.3 HIGH-EFFICIENCY FILTERS

- A. Description: Factory-fabricated 95 percent DOP filters with holding casing.
- B. Media: UL 586, fibrous glass, constructed of continuous sheets with closely spaced pleats with aluminum separators.
- C. Frame Material: Galvanized steel.
- D. Media to Frame Side Bond: Neoprene adhesive.

- E. Face Gasket: Neoprene expanded rubber.

2.4 SIDE-SERVICE HOUSINGS

- A. Description: Factory-assembled, side-service housings, constructed of galvanized steel, with flanges to connect to duct system.
- B. Prefilters: Integral tracks to accommodate 2-inch (50-mm) disposable or washable filters.
- C. Access Doors: Continuous gaskets on perimeter and positive-locking devices. Arrange so filter cartridges can be loaded from either access door.
- D. Sealing: Incorporate positive-sealing gasket material on channels to seal top and bottom of filter cartridge frames to prevent bypass of unfiltered air.

2.5 FILTER GAGES

- A. Description: Diaphragm type with dial and pointer in metal case, vent valves, black figures on white background, and front recalibration adjustment.
 - 1. Diameter: 4-1/2 inches (115 mm).
 - 2. Range: 0- to 1.0-inch wg (0 to 250 Pa).
- B. Accessories: Static-pressure tips, tubing, gage connections, and mounting bracket.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install filter frames according to manufacturer's written instructions.
- B. Position each filter unit with clearance for normal service and maintenance.
- C. Install filters in position to prevent passage of unfiltered air.
- D. Install filter gage for each filter bank.
- E. Install filter gage static-pressure tips upstream and downstream from filters to measure pressure drop through filter. Mount filter gages on outside of filter housing or filter plenum in an accessible position. Adjust and level inclined gages.
- F. Coordinate filter installations with duct and air-handling unit installations.

3.2 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components, filter and filter-frame installation, and to assist in field testing. Report results in writing.

3.3 CLEANING

- A. After completing system installation and testing, adjusting, and balancing air-handling and air-distribution systems, clean filter housings and install new filter media.

END OF SECTION 23 41 00

THIS PAGE LEFT INTENTIONALLY LEFT BLANK

SECTION 235100

BREECHINGS, CHIMNEYS, AND STACKS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Listed double-wall vents.
- B. Related Sections include the following:
 - 1. Section "Draft Control Devices" for induced-draft and mechanical fans and for motorized and barometric dampers.

1.3 SUBMITTALS

- A. Product Data: For the following:
 - 1. Type B and BW vents.
 - 2. Building-heating-appliance chimneys.
 - 3. Guy wires and connectors.
- B. Shop Drawings: For vents, breechings, chimneys, and stacks. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, methods of field assembly, components, hangers and seismic restraints, and location and size of each field connection.
 - 2. For installed products indicated to comply with design loads, include calculations required for selecting seismic restraints and structural analysis data signed and sealed by the qualified professional Commissioner licensed in the State of New York responsible for their preparation.
- C. Welding certificates.

D. Manufacturer Seismic Qualification Certification: Submit certification that factory-fabricated breeching, chimneys, and stacks; accessories; and components will withstand seismic forces.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - a. 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. Dimensioned Outline Drawings of Breeching, Chimneys, and Stacks: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of anchorage devices on which the certification is based and their installation requirements.

E. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain listed system components through one source from a single manufacturer.
- B. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," for hangers and supports and AWS D9.1/D9.1M, "Sheet Metal Welding Code," for shop and field welding of joints and seams in vents, breechings, and stacks.
- C. Certified Sizing Calculations: Manufacturer shall certify venting system sizing calculations.

1.5 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Section "Roof Accessories."

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of venting system that fail in materials or workmanship within specified warranty period. Failures include, but are not limited to, structural failures caused by expansion and contraction.
 1. Warranty Period: 25 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 LISTED TYPE B AND BW VENTS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
1. American Metal Products; MASCO Corporation.
 2. Hart & Cooley, Inc.
 3. Heat-Fab, Inc.
 4. Industrial Chimney Company.
 5. Metal-Fab, Inc.
 6. Selkirk Inc.; Selkirk Metalbestos and Air Mate.
 7. Van-Packer Company, Inc.
- B. Description: Double-wall metal vents tested according to UL 441 and rated for 480 deg F (248 deg C) continuously for Type B, or 550 deg F (288 deg C) continuously for Type BW; with neutral or negative flue pressure complying with NFPA 211.
- C. Construction: Inner shell and outer jacket separated by at least a 1/4-inch (6-mm) airspace.
- D. Inner Shell: ASTM A 666, Type 430 stainless steel.
- E. Outer Jacket: Aluminized steel.
- F. Accessories: Tees, elbows, increasers, draft-hood connectors, terminations, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight sections; all listed for same assembly.
1. Termination: Stack cap designed to exclude minimum 90 percent of rainfall.

2.2 LISTED CHIMNEYS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
1. American Metal Products; MASCO Corporation.
 2. Hart & Cooley, Inc.
 3. Heat-Fab, Inc.
 4. Industrial Chimney Company.
 5. Metal-Fab, Inc.
 6. Selkirk Inc.; Selkirk Metalbestos and Air Mate.
 7. Van-Packer Company, Inc.

- B. Description: Double-wall metal vents tested according to UL 103 and rated for 1000 deg F (538 deg C) continuously, or 1700 deg F (926 deg C) for 10 minutes; with neutral or negative flue pressure complying with NFPA 211.
- C. Construction: Inner shell and outer jacket separated by at least a 2-inch (50-mm) annular space filled with high-temperature, ceramic-fiber insulation.
- D. Inner Shell: ASTM A 666, Type 316 stainless steel.
- E. Inner Shell: ASTM A 666, Type 316 stainless steel.
- F. Outer Jacket: Aluminized steel.
- G. Accessories: Tees, elbows, increasers, draft-hood connectors, terminations, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight sections; all listed for same assembly.
 - 1. Termination: Round chimney top designed to exclude minimum 98 percent of rainfall.

2.3 GUYING AND BRACING MATERIALS

- A. Cable: Four galvanized, stranded wires of the following thickness:
 - 1. Minimum Size: 1/4 inch (6 mm) in diameter.
 - 2. For ID Sizes 4 to 15 Inches (100 to 381 mm): 5/16 inch (8 mm).
 - 3. For ID Sizes 18 to 24 Inches (457 to 610 mm): 3/8 inch (9.5 mm).
 - 4. For ID Sizes 27 to 30 Inches (685 to 762 mm): 7/16 inch (11 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of work.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATION

- A. Listed Type B and BW Vents: Vents for boilers, water heaters and other certified gas appliances.
- B. Listed Chimneys: exhaust for engines.

3.3 INSTALLATION OF LISTED VENTS AND CHIMNEYS

- A. Locate to comply with minimum clearances from combustibles and minimum termination heights according to product listing or NFPA 211, whichever is most stringent.
- B. Support vents at intervals recommended by manufacturer to support weight of vents and all accessories, without exceeding appliance loading.
- C. Slope breechings down in direction of appliance, with condensate drain connection at lowest point piped to nearest drain.
- D. Lap joints in direction of flow.
- E. Connect base section to foundation using anchor lugs of size and number recommended by manufacturer.
- F. Join sections with acid-resistant joint cement to provide continuous joint and smooth interior finish.
- G. Erect stacks plumb to finished tolerance of no more than 1 inch (25 mm) out of plumb from top to bottom.

3.4 CLEANING

- A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes.
- B. Clean breechings internally, during and after installation, to remove dust and debris. Clean external surfaces to remove welding slag and mill film. Grind welds smooth and apply touchup finish to match factory or shop finish.
- C. Provide temporary closures at ends of breechings, chimneys, and stacks that are not completed or connected to equipment.

END OF SECTION 23 51 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 235113

DRAFT CONTROL DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Barometric dampers.
 - 2. Vent dampers.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for dampers. Include plans, elevations, sections, details, and attachments to other work. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, hangers and seismic restraints, and location and size of each field connection.
 - 1. Wiring Diagrams: Power, signal, and control wiring.
- C. Operation and Maintenance Data: For draft control devices to include in emergency, operation, and maintenance manuals.
- D. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of dampers that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 BAROMETRIC DAMPERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - 1. Babco Inc.
 - 2. EXHAUSTO, Inc.
 - 3. FAMCO.
 - 4. Field Controls L.L.C.; Venting Solutions Company (The).
 - 5. Quickdraft; a Litzler Company.
 - 6. Tec-Air Inc.
 - 7. Wing Draft Inducers; Subsidiary of Smiths Industries.
- B. Damper Construction: High-temperature-enamel-painted steel damper and housing with galvanized-steel breeching connection. Adjustable counterweight with lock. Include knife-edge bearings that do not require lubrication.

2.2 VENT DAMPERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
 - 1. Effikal International Inc.
 - 2. Field Controls L.L.C.; Venting Solutions Company (The).
 - 3. Johnson Controls, Inc.; Controls Group.
- B. Damper Construction: Stainless-steel damper blade, shaft, and vent pipe with metal, prelubricated bearings.
 - 1. Electric motor sized to power damper open and closed in approximately 15 seconds in each direction. Power is off when damper is at rest.
 - 2. Comply with ANSI Z21.66.
- C. Controls:
 - 1. Control transformer.

2. Keyed wiring harness.
3. Damper end-switch to prove damper is open.
4. Interlock with boiler to permit burner operation when damper is open.
5. Hold-open switch for troubleshooting boiler controls.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install listed components in a manner complying with the listing.
- B. Secure barometric dampers to breechings with hardware compatible with connected materials.
- C. Locate barometric and motorized vent dampers as close to draft hood collar as possible.
- D. Secure barometric and motorized vent dampers to appliances, breechings, or chimneys with hardware compatible with connected materials.

3.2 CONNECTIONS

- A. Ground equipment according to Division 26.
- B. Connect wiring according to Division 26.

3.3 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.
- B. Remove and replace malfunctioning components and recheck.

3.4 ADJUSTING

- A. Set field-adjustable switches and controls as indicated.

3.5 DEMONSTRATION

- A. Train City of New York's maintenance personnel to adjust, operate, and maintain draft control devices.

END OF SECTION 23 51 13

THIS PAGE LEFT INTENTIONALLY LEFT BLANK

SECTION 235216
CONDENSING BOILERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes packaged cast-iron boilers, trim, and accessories for generating hot water with the following configurations and burners:
 - 1. Factory assembled.
 - 2. Forced-draft, gas burner.

1.3 SUBMITTALS

- A. Product Data: Include performance data, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: For boilers, boiler trim, and accessories. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Design calculations signed and sealed by a qualified professional Commissioner licensed in the State of New York.
 - a. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints.
 - 2. Wiring Diagrams: Power, signal, and control wiring.
- C. Manufacturer Seismic Qualification Certification: Submit certification that boiler, accessories, and components will withstand seismic forces.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - a. 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. 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.
- D. Source quality-control test reports.
- E. Field quality-control test reports.
- F. Operation and Maintenance Data: For boilers, components, and accessories to include in emergency, operation, and maintenance manuals.
- G. Warranty: Special warranty specified in this Section.
- H. Other Informational Submittals:
1. Startup service reports.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. ASME Compliance: Fabricate and label boilers to comply with ASME Boiler and Pressure Vessel Code.
- C. ASHRAE/IESNA 90.1 Compliance: Boilers shall have minimum efficiency according to "Gas-Minimum Efficiency Requirements."
- D. DOE Compliance: Minimum efficiency shall comply with 10 CFR 430, Subpart B, Appendix N, "Uniform Test Method for Measuring the Energy Consumption of Furnaces and Boilers."
- E. I=B=R Compliance: Boilers shall be tested and rated according to HI's "Rating Procedure for Heating Boilers" and "Testing Standard for Commercial Boilers," with I=B=R emblem on a nameplate affixed to boiler.
- F. UL Compliance: Test boilers for compliance with UL 795, "Commercial-Industrial Gas Heating Equipment." Boilers shall be listed and labeled by a testing agency acceptable to authorities having jurisdiction.

1.5 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace controls and heat exchangers of boilers that fail in materials or workmanship within specified warranty period.
1. Warranty Period for Controls: Two years from date of Substantial Completion.
 2. Warranty Period for Heat Exchangers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
1. Lochinvar Corporation.
 2. Gasmaster Industries Incorporated.
 2. Hydrotherm, Inc.; a division of Mestek, Inc.
 5. AERCO International.
 6. Heat Transfer Products, Inc.

2.2 MANUFACTURED UNITS

- A. Description: Factory fabricated and assembled.
1. Cast-iron sections shall be sealed pressure tight and held together with tie rods set on an insulated steel base; including insulated jacket and flue-gas vent connection.
 2. Ship cast-iron sections disassembled with all materials and equipment, including seals, tie rods, and insulated jacket and flue-gas vent connection for field assembly.
- B. Cast-Iron Section Design:
1. Configuration: Wet base.
 2. Number of Passes: Multiple.
 3. Sectional Joints: High-temperature sealant to seal flue-gas passages not in contact with heating medium, fiber roping, and held together with tie rods.
 4. Drain and blowdown tappings.
 5. Return injection tube to equalize water flow to all sections.
 6. Crown inspection tappings with brass plugs.
 7. Built-in air separator.
- C. Combustion Chamber: Equipped with insulation and flame observation ports, front and back.
- D. Casing:

1. Jacket: Galvanized sheet metal, with snap-in or interlocking closures and baked-enamel protective finish.
2. Insulation: Minimum 2-inch- (50-mm-) thick, mineral-fiber insulation surrounding the heat exchanger.
3. Combustion Chamber Access: Refractory lined, hinged, front.
4. Access: For cleaning between cast-iron sections.
5. Draft Hood: Flue canopy and rear flue connection shall be constructed of stainless steel containing adjustable outlet damper assembly.
6. Insulated base constructed of aluminized steel to permit boiler to be installed on combustible floor.
7. Mounting Frame: Steel rails to mount assembled boiler package on concrete base.
 - a. Seismic Fabrication Requirements: Fabricate mounting base and attachment to boiler, accessories, and components with reinforcement strong enough to withstand seismic forces.
8. Control Cabinet: Sheet metal casing shall cover all controls, gas train, and burner.

E. Draft Diverter: Separate galvanized-steel assembly.

2.3 BURNER

- A. Burner: Welded construction with multivane, stainless-steel, flame-retention diffuser for natural gas.
- B. Blower: Forward-curved centrifugal fan integral to burner, directly driven by motor; with adjustable, dual-blade damper assembly and locking quadrant to set air-fuel ratio.
 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.
- C. Gas Train: Control devices and modulating control sequence shall comply with requirements in IRI and UL.
- D. Pilot: Intermittent-electric-spark pilot ignition with 100 percent main-valve and pilot-safety shutoff with electronic supervision of burner flame.

2.4 TRIM

- A. Include devices sized to comply with ANSI B31.9, "Building Services Piping."
- B. Aquastat Controllers: Operating[, firing rate, and high limit.
- C. Safety Relief Valve: ASME rated.

- D. Pressure and Temperature Gage: Minimum 3-1/2-inch- (89-mm-) diameter, combination water-pressure and -temperature gage. Gages shall have operating-pressure and -temperature ranges so normal operating range is about 50 percent of full range.
- E. Boiler Air Vent: Automatic.
- F. Drain Valve: Minimum NPS 3/4 (DN 20) hose-end gate valve.

2.5 CONTROLS

- A. Refer to Section "HVAC Instrumentation and Controls."
- B. Boiler operating controls shall include the following devices and features:
 - 1. Control transformer.
 - 2. Set-Point Adjust: Set points shall be adjustable.
 - 3. Sequence of Operation: Electric, factory-fabricated and field-installed panel to control burner firing rate to reset supply-water temperature inversely with outside-air temperature. At 0 deg F (minus 17 deg C) outside-air temperature, set supply-water temperature at 200 deg F (93 deg C); at 60 deg F (15 deg C) outside-air temperature, set supply-water temperature at 140 deg F (60 deg C).
- C. Burner Operating Controls: To maintain safe operating conditions, burner safety controls limit burner operation.
 - 1. High Cutoff: Automatic reset stops burner if operating conditions rise above maximum boiler design temperature.
 - 2. Low-Water Cutoff Switch: Electronic probe shall prevent burner operation on low water. Cutoff switch shall be manual-reset type.
 - 3. Blocked Vent Safety Switch: Manual-reset switch factory mounted on draft diverter.
 - 4. Rollout Safety Switch: Factory mounted on boiler combustion chamber.
 - 5. Audible Alarm: Factory mounted on control panel with silence switch; shall sound alarm for above conditions.
- D. Interface to Boiler Control Panel: Factory install hardware and software to boiler control panel to monitor, control, and display boiler status and alarms.
 - 1. Hardwired Points:
 - a. Monitoring: On/off status, common trouble alarm and low water level alarm.
 - b. Control: On/off operation, hot water supply temperature set-point adjustment.

2.6 ELECTRICAL POWER

- A. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 26 Sections.

- B. Single-Point Field Power Connection: Factory-installed and -wired switches, motor controllers, transformers, and other electrical devices necessary shall provide a single-point field power connection to boiler.

1. House in NEMA 250, Type 1 enclosure.
2. Wiring shall be numbered and color-coded to match wiring diagram.
3. Install factory wiring outside of an enclosure in a metal raceway.
4. Field power interface shall be to fused disconnect switch.
5. Provide branch power circuit to each motor and to controls with disconnect switch.
6. Provide each motor with overcurrent protection.

2.7 CAPACITIES AND CHARACTERISTICS:

- A. Refer to plan schedules for additional information.
1. Heating Medium: Hot water.
 2. Design Water Pressure Rating: 80 psig (550 kPa).
 3. Safety Relief Valve Setting: 55 psig (kPa) (adjustable).
 4. Design Pressure Drop: 5 psig (kPa).
 5. Minimum Efficiency: 80 AFUE.
 6. Number of Passes: Two.
 7. Blower RPM: 1750.
 8. Electrical Characteristics: refer to plan schedules.

2.8 SOURCE QUALITY CONTROL

- A. Test and inspect factory-assembled boilers, before shipping, according to ASME Boiler and Pressure Vessel Code.
- B. Burner and Hydrostatic Test: Factory adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions, and carbon monoxide in flue gas and to achieve combustion efficiency; perform hydrostatic test.
- C. Allow City of New York access to source quality-control testing of boilers. Notify Commissioner 14 days in advance of testing.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Before boiler installation, examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations, and piping and electrical connections to verify actual locations, sizes, and other conditions affecting boiler performance, maintenance, and operations.
1. Final boiler locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.

- B. Examine mechanical spaces for suitable conditions where boilers will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 BOILER INSTALLATION

- A. Install boilers level on concrete base. Concrete base is specified in Section "Basic Mechanical Materials and Methods."
- B. Vibration Isolation: Elastomeric mounts with a minimum static deflection of 0.25 inch (6.35 mm).
- C. Install gas-fired boilers according to NFPA 54.
- D. Assemble boiler sections in sequence and seal between each section.
- E. Assemble and install boiler trim.
- F. Install electrical devices furnished with boiler but not specified to be factory mounted.
- G. Install control wiring to field-mounted electrical devices.

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to boiler to allow service and maintenance.
- C. Refer to plumbing drawings for gas train piping requirements. Piping shall be at least full size of gas train connection. Provide a reducer if required. Provide connection to factory pre-piped gas train.
- D. Connect hot-water piping to supply- and return-boiler tappings with shutoff valve and union or flange at each connection.
- E. Install piping from safety relief valves to nearest floor drain.
- F. Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.
- G. Connect breeching full size to boiler outlet.
- H. Ground water boiler.

3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
 - 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.
- B. Tests and Inspections:
 - 1. Perform installation and startup checks according to manufacturer's written instructions.
 - 2. Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.
 - 3. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.
 - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - a. Burner Test: Adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions, and carbon monoxide in flue gas and to achieve combustion efficiency.
 - b. Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level and water temperature.
 - c. Set field-adjustable switches and circuit-breaker trip ranges as indicated.
- C. Remove and replace malfunctioning units and retest as specified above.
- D. 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.
- E. Performance Tests:
 - 1. Engage a factory-authorized service representative to inspect component assemblies and equipment installations, including connections, and to conduct performance testing.
 - 2. Boilers shall comply with performance requirements indicated, as determined by field performance tests. Adjust, modify, or replace equipment to comply.
 - 3. Perform field performance tests to determine capacity and efficiency of boilers.
 - a. Test for full capacity.
 - b. Test for boiler efficiency at low fire 20, 40, 60, 80, 100, 80, 60, 40, and 20 percent of full capacity. Determine efficiency at each test point.
 - 4. Repeat tests until results comply with requirements indicated.
 - 5. Provide analysis equipment required to determine performance.
 - 6. Provide temporary equipment and system modifications necessary to dissipate the heat produced during tests if building systems are not adequate.
 - 7. Notify Commissioner in advance of test dates.
 - 8. Document test results in a report and submit to Commissioner.

3.5 DEMONSTRATION

- A. Train City of New York's maintenance personnel to adjust, operate, and maintain boilers. Video training sessions.

END OF SECTION 235216

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 237433

PACKAGED, OUTDOOR, HEATING AND COOLING MAKEUP AIR-CONDITIONERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
- B. The DDC General Conditions shall apply to this Section.

1.2 SUMMARY

- A. This Section includes cooling and heating rooftop units.

1.3 DEFINITIONS

- A. DDC: Direct-digital controls.

1.4 SUBMITTALS

- A. Product Data: Include rated capacities, furnished specialties, and accessories.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, methods of field assembly, components, and location and size of each field connection. Prepare the following by or under the supervision of a qualified professional Commissioner:
 - 1. Design Calculations: For selecting and designing restrained vibration isolation roof-curb rails.
 - 2. Mounting Details: For securing and flashing roof curb to roof structure. Indicate coordinating requirements with roof membrane system.
 - 3. Wiring Diagrams: Power, signal, and control wiring.
- C. Coordination Drawings: Rooftop replacement-air units to roof-curb mounting details 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. Size and location of rooftop replacement-air unit mounting rails and anchor points and methods for anchoring units to roof curb.

2. Required roof penetrations for ducts, pipes, and electrical raceways, including size and location of each penetration.

- D. Startup service reports.
- E. Operation and Maintenance Data: For rooftop replacement-air units to include in emergency, operation, and maintenance manuals.
- F. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of rooftop replacement-air units and are based on the specific system indicated. Refer to 'General Conditions' as applicable "Product Requirements."
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.6 COORDINATION

- A. Coordinate size, installation, and structural capacity of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 7 Section "Roof Accessories."
- B. Coordinate size, location, and installation of rooftop replacement-air unit manufacturer's roof curbs and equipment supports with roof Installer.
 1. Coordinate installation of restrained vibration isolation roof-curb rails, which are specified in Division 23 Section "Mechanical Vibration and Seismic Controls."

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace components listed below that fail in materials or workmanship within specified warranty period.
 1. Warranty Period for Compressors: Manufacturer's standard, but not less than five years from date of Substantial Completion.
 2. Warranty Period for Heat Exchangers: Manufacturer's standard, but not less than five 10 years from date of Substantial Completion.

1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fan Belts: One set for each belt-driven fan.
 - 2. Filters: One set for each unit.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AAON, Inc.
 - 2. Trane, Inc.
 - 3. Addison Products Company.
 - 4. Des Champs Laboratories, Incorporated.
 - 5. LCSysystems.
 - 6. Reznor-Thomas & Betts Corporation; Mechanical Products Division.

2.2 CABINET

- A. Construction: Double wall.
- B. Exterior Casing: Galvanized steel with baked-enamel paint finish with lifting lugs and knockouts for electrical and piping connections.
- C. Interior Casing: Stainless steel.
- D. Base Rails: Galvanized-steel rails for mounting on roof curb.
- E. Service Doors: Hinged access doors with neoprene gaskets.
- F. Internal Insulation: Fibrous-glass duct lining complying with ASTM C 1071, Type II.
 - 1. Thickness: 2 inches (50 mm).
 - 2. Insulation Adhesive: Comply with ASTM C 916, Type I.
 - 3. Mechanical Fasteners: Galvanized steel, suitable for adhesive attachment, mechanical attachment, or welding attachment to casing without damaging liner and without causing air leakage when applied as recommended by manufacturer.
- G. Condensate Drain Pans: Formed sections of stainless-steel sheet designed for self-drainage. Fabricate pans with slopes to preclude buildup of microbial slime.

- H. Roof Curb: Full-perimeter curb of sheet metal, minimum 16 inches (400 mm) high, with wood nailer, neoprene sealing strip, and welded Z-bar flashing.

2.3 SUPPLY-AIR FAN

- A. Fan: Forward-curved centrifugal; statically and dynamically balanced, coated steel, mounted on solid-steel shaft with pillow-block bearings rated L_{50} for 200,000 hours and having external grease fittings.
- B. Motor: Totally enclosed, single-speed motor.
- C. Drive: V-belt drive with matching fan pulley and adjustable motor sheaves and belt assembly with minimum 1.4 service factor.
- D. Mounting: Fan wheel, motor, and drives shall be mounted in fan casing with restrained, isolators.

2.4 REFRIGERATION SYSTEM

- A. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Code for Mechanical Refrigeration."
- B. Compressors: Scroll compressors with integral vibration isolators, internal overcurrent and overtemperature protection, internal pressure relief, and crankcase heater.
- C. EER and COP: as defined by ASHRAE/IESNA 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."
- D. Refrigerant: R-410A.
- E. Refrigeration System Specialties:
 - 1. Expansion valve with replaceable thermostatic element.
 - 2. Refrigerant dryer.
 - 3. High-pressure switch.
 - 4. Low-pressure switch.
 - 5. Thermostat for coil freeze-up protection during low ambient temperature operation or loss of air.
 - 6. Brass service valves installed in discharge and liquid lines.
 - 7. Operating charge of refrigerant.
 - 8. Antirecycle timer.
 - 9. Internal thermal-overload protection.
- F. Capacity Control: Single compressor with evaporator and condenser coil within the refrigerant section to provide initial precooling and reheat for humidity control.

- G. Refrigerant Coils: Evaporator, condenser, and reheat condenser coils shall be designed, tested, fabricated, and rated according to ARI 410 and ASHRAE 33. Coils shall be leak tested under water with air at 315 psig (2170 kPa).

1. Capacity Reduction: Circuit coils for [face control.
2. Tubes: Copper.
3. Fins: Aluminum with minimum fin spacing of 0.071 inch (1.81 mm).
4. Fin and Tube Joint: Mechanical bond.
5. Suction and Distributor: Seamless copper tube with brazed joints.
6. Coating: Phenolic epoxy corrosion-protection coating on both coils.
7. Source Quality Control: Test to 450 psig (3105 kPa), and to 300 psig (2070 kPa) underwater.

- H. Condenser Fan: Propeller type, directly driven by motor.

- I. Safety Controls:

1. Compressor motor and outside-coil fan motor low ambient lockout.
2. Overcurrent protection for compressor motor and outside-coil fan motors.

2.5 HEATING COILS

- A. Hot-Water Coils: Continuous-circuit, Self-draining and Cleanable coil fabricated and tested according to ARI 410 with aluminum fins and seamless copper tube in galvanized stainless-steel casing.

1. Headers: Seamless copper tube with brazed joints, prime coated.
2. Control valves are specified in Division 23 Section "HVAC Instrumentation and Controls."

- B. Steam Coils: Distributing coil fabricated and tested according to ARI 410, with threaded steam supply and condensate connections. Nonfreeze type having aluminum-plate fin and seamless copper double tube in galvanized-steel casing, pitched for proper drainage; tested to 150 psig (1035 kPa) and leak tested to 100 psig (690 kPa) with air under water.

1. Control valves are specified in Division 23 Section "HVAC Instrumentation and Controls."

2.6 OUTDOOR-AIR INTAKE AND DAMPERS

- A. Dampers: Leakage rate, according to AMCA 500, shall not exceed 2 percent of air quantity at face velocity of 2000 fpm (10 m/s) through damper and pressure differential of 4-inch wg (1000 Pa).

- B. Damper Operators: Electric.

- C. Mixing Boxes: Parallel-blade, galvanized-steel dampers mechanically fastened to steel operating rod inside cabinet. Connect operating rods with common interconnecting linkages so dampers operate simultaneously.
- D. Outdoor-Air Intake Hoods: Galvanized steel, with bird screen and finish to match cabinet.

2.7 FILTERS

- A. Comply with NFPA 90A.
- B. Disposable Panel Filters: 2-inch- (50-mm-) thick, factory-fabricated, flat-panel-type, disposable air filters with holding frames, with a minimum efficiency report value of 6 according to ASHRAE 52.2 and 90 percent average arrestance according to ASHRAE 52.1.
 - 1. Media: Interlaced glass fibers sprayed with nonflammable adhesive.
 - 2. Frame: Galvanized steel.

2.8 CONTROLS

- A. Control equipment and sequence of operation are specified in Division 23 Section "HVAC Instrumentation and Controls."
- B. Factory-wire connection for controls' power supply.
- C. Control devices, including sensors, transmitters, relays, switches, thermostats, humidistats, detectors, operators, actuators, and valves, shall be manufacturer's standard items to accomplish indicated control functions.
- D. Unit Controls: Solid-state control board and components with field-adjustable control parameters.
- E. Supply-Fan Control: Units shall be electrically interlocked with corresponding exhaust fans, to operate continuously when exhaust fans are running. Time clock shall switch operation from occupied to unoccupied. Night setback thermostat shall cycle fan during unoccupied periods to maintain space temperature.
 - 1. Timer: Seven-day electronic clock.
 - 2. Electrically interlock kitchen hood fire-extinguishing system to de-energize replacement-air unit when fire-extinguishing system discharges.
- F. Remote-Mounted Status Panel:
 - 1. Cooling/Off/Heating Controls: Control operational mode.
 - 2. Damper Position: Indicates position of outdoor-air dampers in terms of percentage of outdoor air.
 - 3. Status Lights:

- a. Filter dirty.
- b. Fan operating.
- c. Cooling operating.
- d. Heating operating.

G. Refrigeration System Controls:

- 1. Unit-mounted enthalpy controller shall lock out refrigerant system when outdoor-air enthalpy is less than 28 Btu/lb (65 kJ/kg) of dry air or outdoor-air temperature is less than 60 deg F (15 deg C).
- 2. Outdoor-air sensor de-energizes dehumidifier operation when outdoor-air temperature is less than 60 deg F (15 deg C).
- 3. Wall-mounting, relative-humidity sensor energizes dehumidifier operation when relative humidity is more than 60 percent.

H. Heating Controls:

- 1. Remote-mounting sensor for field installation in supply-air duct with sensor adjustment located in control panel modulates gas furnace burner to maintain space temperature.
- 2. Wall-mounting, space-temperature sensor with adjustment on remote-control panel that modulates gas furnace burner to maintain space temperature.
- 3. Remote Setback Thermostat: Adjustable room thermostat selected by timer, set at 50 deg F (10 deg C); cycles supply fan and gas furnace burner to maintain space temperature.

I. Damper Controls:

- 1. Wall-mounting pressure sensor modulates outdoor- and return-air dampers to maintain a positive pressure in space served by rooftop replacement-air unit at minimum 0.05-inch wg (12.4 Pa).
- 2. When exhaust fans stop, set outdoor- and return-air damper to 25 percent outdoor air. When exhaust fans start, close return-air damper and fully open outdoor-air damper.

J. Integral Smoke Alarm: Smoke detector installed in supply air.

K. DDC Temperature Control: Stand-alone control module for link between unit controls and DDC temperature-control system. Control module shall be compatible with temperature-control system specified in Division 23 Section "HVAC Instrumentation and Controls." Links shall include the following:

- 1. Start/stop interface relay, and relay to notify DDC temperature-control system alarm condition.
- 2. Hardware interface or additional sensors for the following:
 - a. Room temperature.
 - b. Discharge air temperature.
 - c. Refrigeration system operating.

2.9 MOTORS

- A. Comply with requirements in Division 23 Section "Motors."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting installation of rooftop replacement-air units.
- 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 rooftop replacement-air units will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install roof curb on roof structure, according to NRCA's "Low-Slope Membrane Roofing Construction Details Manual," Illustration "Raised Curb Detail for Rooftop Air Handling Units and Ducts." Install and secure rooftop replacement-air units on curbs and coordinate roof penetrations and flashing with roof construction.
- B. Install restrained vibration isolation roof-curb rails on roof structure according to NRCA's "Low-Slope Membrane Roofing Construction Details Manual," Illustration "Raised Curb Detail for Rooftop Air Handling Units and Ducts." Install and secure rooftop replacement-air units on rails and coordinate roof penetrations and flashing with roof construction. Restrained isolation roof-curb rails are specified in Division 23 Section "Mechanical Vibration and Seismic Controls."
- C. Install wall- and duct-mounting sensors, thermostats, and humidistats furnished by manufacturers for field installation. Install control wiring and make final connections to control devices and unit control panel.

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

- B. Duct Connections: Duct installation requirements are specified in Division 23 Section "Metal Ducts." Drawings indicate the general arrangement of ducts. Connect supply and return ducts to rooftop replacement-air units with flexible duct connectors. Flexible duct connectors are specified in Division 23 Section "Duct Accessories."
- C. Electrical Connections: Comply with requirements in Division 26 Sections for power wiring, switches, and motor controls.
- D. Ground equipment according to Division 26 Section "Grounding and Bonding."

3.4 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 and perform the following:
 - 1. Inspect for visible damage to furnace combustion chamber.
 - 2. Inspect for visible damage to compressor, air-cooled outside coil, and fans.
 - 3. Inspect casing insulation for integrity, moisture content, and adhesion.
 - 4. Verify that clearances have been provided for servicing.
 - 5. Verify that controls are connected and operable.
 - 6. Verify that filters are installed.
 - 7. Clean outside coil and inspect for construction debris.
 - 8. Clean furnace flue and inspect for construction debris.
 - 9. Inspect operation of power vents.
 - 10. Purge gas line.
 - 11. Inspect and adjust vibration isolators and seismic restraints.
 - 12. Verify bearing lubrication.
 - 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.
 - 16. Start refrigeration system when outdoor-air temperature is within normal operating limits.
 - 17. Inspect and record performance of interlocks and protective devices including response to smoke detectors by fan controls and fire alarm.
 - 18. Operate unit for run-in period.
 - 19. Perform the following operations for both minimum and maximum firing and adjust burner for peak efficiency:
 - a. Measure gas pressure at manifold.
 - b. Measure combustion-air temperature at inlet to combustion chamber.
 - c. Measure flue-gas temperature at furnace discharge.
 - d. Perform flue-gas analysis. Measure and record flue-gas carbon dioxide and oxygen concentration.

- e. Measure supply-air temperature and volume when burner is at maximum firing rate and when burner is off. Calculate useful heat to supply air.
 - 20. Calibrate thermostats.
 - 21. Adjust and inspect high-temperature limits.
 - 22. Inspect outdoor-air dampers for proper stroke and interlock with return-air dampers.
 - 23. Start refrigeration system and measure and record the following:
 - 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.
 - 24. Verify operational sequence of controls.
 - 25. Measure and record the following airflows. Plot fan volumes on fan curve.
 - a. Supply-air volume.
 - b. Return-air volume.
 - c. Outdoor-air intake volume.
 - 26. 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.
 - 27. Verify operation of remote panel including pilot-light operation and failure modes. Inspect the following:
 - a. High-limit heat exchanger.
 - b. Alarms.
 - C. After startup and performance testing, change filters, verify bearing lubrication, and adjust belt tension.
 - D. Remove and replace components that do not pass tests and inspections and retest as specified above.
 - E. Prepare written report of the results of startup services.
- 3.5 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 of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project outside normal occupancy hours for this purpose.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train City of New York's maintenance personnel to adjust, operate, and maintain rooftop replacement-air units. 'General Conditions' as applicable "Closeout Procedures and Demonstration and Training."

END OF SECTION 237433

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 238126

SPLIT-SYSTEM AIR-CONDITIONERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Work of this section is part of Add Alternate 2.

1.2 SUMMARY

- A. Section includes split-system air-conditioning and heat-pump units consisting of separate evaporator-fan and compressor-condenser components.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.
- B. LEED Submittals:
 - 1. Product Data for Credit EA 4: Documentation indicating that equipment and refrigerants comply.
- C. Shop Drawings: 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. Wiring Diagrams: For power, signal, and control wiring.
- D. Samples for Initial Selection: For units with factory-applied color finishes.

1.4 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.
- B. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For split-system air-conditioning units to include in emergency, operation, and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Filters: One set(s) for each air-handling unit.
 - 2. Gaskets: One set(s) for each access door.
 - 3. Fan Belts: One set(s) for each air-handling unit fan.

1.7 QUALITY ASSURANCE

- 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 Compliance:
 - 1. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."
 - 2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 4 - "Outdoor Air Quality," Section 5 - "Systems and Equipment," Section 6 - "Procedures," and Section 7 - "Construction and System Start-up."
- C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

1.8 COORDINATION

- A. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork are specified in Division 03 Section "Cast-in-Place Concrete."
- B. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period:

- a. For Compressor: Five year(s) from date of Substantial Completion.
- b. For Parts: One year(s) from date of Substantial Completion.
- c. For Labor: One year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - 1. Carrier Corporation; Home Comfort and HVAC Building & Industrial Systems.
 - 2. Mitsubishi Electric & Electronics USA, Inc.; HVAC Advanced Products Division.
 - 3. Mitsubishi Electric Sales Canada Inc.
 - 4. Mitsubishi Heavy Industries America, Inc.
 - 5. SANYO North America Corporation; SANYO Fisher Company.
 - 6. Trane; a business of American Standard companies.
 - 7. YORK; a Johnson Controls company.

2.2 OUTDOOR UNITS (5 TONS (18 kW) OR LESS)

- A. Air-Cooled, Compressor-Condenser Components:
 - 1. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
 - 2. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation device. Compressor motor shall have thermal and current-sensitive overload devices, start capacitor, relay, and contactor.
 - a. Compressor Type: Scroll.
 - b. Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.
 - c. Refrigerant Charge: R-407C or R-410A.
 - d. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and liquid subcooler Comply with ARI 210/240.
 - 3. Heat-Pump Components: Reversing valve and low-temperature-air cutoff thermostat.
 - 4. Fan: Aluminum-propeller type, directly connected to motor.
 - 5. Motor: Permanently lubricated, with integral thermal-overload protection.
 - 6. Low Ambient Kit: Permits operation down to 45 deg F (7 deg C).
 - 7. Mounting Base: Polyethylene.

2.3 OUTDOOR UNITS (6 TONS (21 kW) OR MORE)

A. Air-Cooled, Compressor-Condenser Components:

1. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
2. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation device. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
 - a. Compressor Type: Scroll.
 - b. Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.
 - c. Refrigerant Charge: R-407C or R-410A.
 - d. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and liquid subcooler. Comply with ARI 210/240.
3. Heat-Pump Components: Reversing valve and low-temperature-air cutoff thermostat.
4. Fan: Aluminum-propeller type, directly connected to motor.
5. Motor: Permanently lubricated, with integral thermal-overload protection.
6. Low Ambient Kit: Permits operation down to 45 deg F (7 deg C).
7. Mounting Base: Polyethylene.

B. Water-Cooled, Compressor-Condenser Components:

1. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
2. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation device. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
 - a. Compressor Type: Scroll.
 - b. Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.
 - c. Refrigerant Charge: R-407C or R-410A.
3. Heat-Pump Components: Reversing valve.
4. Heat Exchanger: Copper tubes in copper tube or in steel shell, with water-temperature-actuated, water-regulating valve.

2.4 ACCESSORIES

- A. Control equipment and sequence of operation are specified in Division 23 Sections "Instrumentation and Control for HVAC" and "Sequence of Operations for HVAC Controls."
- B. Thermostat: Low voltage with subbase to control compressor and evaporator fan.

- C. Thermostat: Wireless infrared functioning to remotely control compressor and evaporator fan, with the following features:
 - 1. Compressor time delay.
 - 2. 24-hour time control of system stop and start.
 - 3. Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.
 - 4. Fan-speed selection including auto setting.
- D. Automatic-reset timer to prevent rapid cycling of compressor.
- E. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.
- F. Drain Hose: For condensate.
- G. Additional Monitoring:
 - 1. Monitor constant and variable motor loads.
 - 2. Monitor variable-frequency-drive operation.
 - 3. Monitor economizer cycle.
 - 4. Monitor cooling load.
 - 5. Monitor air distribution static pressure and ventilation air volumes.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install units level and plumb.
- B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.
- C. Install ground-mounted, compressor-condenser components on 4-inch (100-mm) thick, reinforced concrete base that is 4 inches (100 mm) larger, on each side, than unit. Concrete, reinforcement, and formwork are specified in Division 03 Section "Cast-in-Place Concrete." Coordinate anchor installation with concrete base.
- D. Install ground-mounted, compressor-condenser components on polyethylene mounting base.
- E. Install roof-mounted, compressor-condenser components on equipment supports specified in Division 07 Section "Roof Accessories." Anchor units to supports with removable, cadmium-plated fasteners.
- F. Install seismic restraints.

- G. Install compressor-condenser components on restrained, spring isolators with a minimum static deflection of 1 inch (25 mm). See Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment."
- H. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
 - 1. Water Coil Connections: Comply with requirements specified in Division 23 Section "Hydronic Piping." Connect hydronic piping to supply and return coil connections with shutoff-duty valve and union or flange on the supply connection and with throttling-duty valve and union or flange on the return connection.
 - 2. Remote, Water-Cooled Condenser Connections: Comply with requirements specified in Division 23 Section "Hydronic Piping." Connect hydronic piping to supply and return connections with shutoff-duty valve and union or flange on the supply connection and with throttling-duty valve and union or flange on the return connection.
- B. Where piping is installed adjacent to unit, allow space for service and maintenance of unit.
- C. Duct Connections: Duct installation requirements are specified in Division 23 Section "Metal Ducts" Drawings indicate the general arrangement of ducts. Connect supply and return ducts to split-system air-conditioning units with flexible duct connectors. Flexible duct connectors are specified in Division 23 Section "Air Duct Accessories."

3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
- 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:
 - 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.

- D. Remove and replace malfunctioning units and retest as specified above.
- E. Prepare test and inspection reports.

3.4 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.

3.5 DEMONSTRATION

- A. Train Owner's maintenance personnel to adjust, operate, and maintain units.

END OF SECTION 238126

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 238219

FAN COIL UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes fan-coil units and accessories.

1.3 DEFINITIONS

- A. BAS: Building automation system.

1.4 ACTION SUBMITTALS

- A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories.
- B. LEED Submittals:
 - 1. Product Data for Credit EA 4: Documentation indicating that equipment and refrigerants comply.
 - 2. Product Data for Prerequisite IEQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."
- C. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 1. Wiring Diagrams: Power, signal, and control wiring.
- D. Samples for Initial Selection: For units with factory-applied color finishes.
- E. Samples for Verification: For each type of fan-coil unit indicated.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Floor plans, reflected ceiling plans, and other details, 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. Ceiling suspension components.
 2. Structural members to which fan-coil units will be attached.
 3. Method of attaching hangers to building structure.
 4. Size and location of initial access modules for acoustical tile.
 5. Items penetrating finished ceiling, including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Access panels.
 6. Perimeter moldings for exposed or partially exposed cabinets.
- B. Manufacturer Seismic Qualification Certification: Submit certification that fan-coil units, accessories, and components will withstand seismic forces defined in Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment." Include the following:
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - a. 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."
 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.
- C. Field quality-control test reports.
- D. Warranty: Special warranty specified in this Section.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fan-coil units to include in emergency, operation, and maintenance manuals. In addition to items specified in 'General Conditions' as applicable "Product Requirements."
- B. "Operation and Maintenance Data," include the following:
1. Maintenance schedules and repair part lists for motors, coils, integral controls, and filters.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fan-Coil-Unit Filters: Furnish spare filters for each filter installed.
 - 2. Fan Belts: Furnish spare fan belts for each unit installed.

1.8 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."
- C. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

1.9 COORDINATION

- A. Coordinate layout and installation of fan-coil units and suspension system components with other construction that penetrates or is supported by ceilings, including light fixtures, HVAC equipment, fire-suppression-system components, and partition assemblies.
- B. Coordinate size and location of wall sleeves for outdoor-air intake.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of condensing units that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Compressor failure.
 - b. Condenser coil leak.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
- B. In the Fan-Coil-Unit Schedule where titles below are column or row headings that introduce lists, the following requirements apply to product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 FAN-COIL UNITS

- A. Basis-of-Design Product: a comparable product by one of the following:
 - 1. Airtherm; a Mestek Company.
 - 2. Carrier Corporation.
 - 3. Engineered Air Ltd.
 - 4. Environmental Technologies, Inc.
 - 5. First Co.
 - 6. International Environmental Corporation.
 - 7. Marlo Coil; Subsidiary of Engineered Support Systems, Inc.
 - 8. Marshall Engineered Products Co., LLC (MEPCO); Dunham-Bush, Inc.
 - 9. McQuay International.
 - 10. Mitsubishi
 - 11. Rosemex.
 - 12. Trane.
 - 13. USA Coil & Air.
 - 14. YORK International Corporation.
- B. Description: Factory-packaged and -tested units rated according to ARI 440, ASHRAE 33, and UL 1995.
- C. Coil Section Insulation: 1-inch thick, coated glass fiber matte-finish complying with ASTM C 1071 and attached with adhesive complying with ASTM C 916.
 - 1. Fire-Hazard Classification: Insulation and adhesive shall have a combined maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.
 - 2. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
- D. Main and Auxiliary Drain Pans: Stainless steel. Fabricate pans and drain connections to comply with ASHRAE 62.1. Drain pans shall be removable.

- E. Chassis: Galvanized steel where exposed to moisture. Floor-mounting units shall have leveling screws.
- F. Cabinet: Steel with baked-enamel finish in manufacturer's custom paint color as selected by Architect.
 - 1. Vertical Unit Front Panels: Removable, steel, with steel discharge grille and channel-formed edges, cam fasteners, and insulation on back of panel.
 - 2. Horizontal Unit Bottom Panels: Fastened to unit with cam fasteners and hinge and attached with safety chain; with integral stamped discharge grilles.
 - 3. Stack Unit Discharge and Return Grille: Aluminum double-deflection discharge grille, and louvered- or panel-type return grille; color as selected by Architect from manufacturer's custom colors. Return grille shall provide maintenance access to fan-coil unit.
 - 4. Steel recessing flanges for recessing fan-coil units into ceiling or wall.
- G. Filters: Minimum arrestance according to ASHRAE 52.1, and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.
 - 1. Washable Foam: 70 percent arrestance and 3 MERV.
 - 2. Glass Fiber Treated with Adhesive: 80 percent arrestance and 5 MERV.
 - 3. Pleated Cotton-Polyester Media: 90 percent arrestance and 7 MERV.
- H. Electric-Resistance Heating Coils: Nickel-chromium heating wire, free of expansion noise and hum, mounted in ceramic inserts in a galvanized-steel housing; with fuses in terminal box for overcurrent protection and limit controls for high-temperature protection. Terminate elements in stainless-steel machine-staked terminals secured with stainless-steel hardware.
- I. Fan and Motor Board: Removable.
 - 1. Fan: Forward curved, double width, centrifugal; directly connected to motor. Thermoplastic or painted-steel wheels, and aluminum, painted-steel, or galvanized-steel fan scrolls.
 - 2. Motor: Permanently lubricated, multispeed; resiliently mounted on motor board. Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
 - 3. Wiring Termination: Connect motor to chassis wiring with plug connection.
- J. Basic Unit Controls:
 - 1. Control voltage transformer.
 - 2. [Wall-mounting] thermostat with the following features:
 - a. Heat-cool-off switch.
 - b. Fan on-auto switch.
 - c. Fan-speed switch.
 - d. Automatic changeover.
 - e. Adjustable deadband.
 - f. Exposed set point.
 - g. Exposed indication.

h. Degree F indication.

K. Terminal Controller:

1. Scheduled Operation: Occupied and unoccupied periods on seven-day clock with a minimum of four programmable periods per day.
2. Unoccupied Period Override Operation: Two hours.
3. Unit Supply-Air Fan Operation:
 - a. Occupied Periods: Fan runs continuously.
 - b. Unoccupied Periods: Fan cycles to maintain room setback temperature.

L. Electrical Connection: Factory wire motors and controls for a single electrical connection.

2.3 DUCTED FAN-COIL UNITS

A. Basis-of-Design Product a comparable product by one of the following:

B. Available Manufacturers:

1. Carrier Corporation.
2. Mitsubishi Electric.
3. International Environmental Corporation.
4. Marlo Coil; Subsidiary of Engineered Support Systems, Inc.
5. McQuay International.
6. Rosemex.

C. Description: Factory-packaged and -tested units rated according to ARI 440, ASHRAE 33, and UL 1995.

D. Coil Section Insulation: 1-inch thick foil-faced glass fiber complying with ASTM C 1071 and attached with adhesive complying with ASTM C 916.

1. Fire-Hazard Classification: Insulation and adhesive shall have a combined maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.
2. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

E. Drain Pans: Stainless steel] Fabricate pans and drain connections to comply with ASHRAE 62.1.

F. Chassis: Galvanized steel where exposed to moisture, with baked-enamel finish and removable access panels.

G. Cabinets: Steel with baked-enamel finish in manufacturer's standard paint color, mill finish

1. Supply-Air Plenum: Sheet metal plenum finished and insulated to match the chassis[with mill-finish, aluminum, double-deflection grille].

2. Return-Air Plenum: Sheet metal plenum finished to match the chassis.
 3. Mixing Plenum: Sheet metal plenum finished and insulated to match the chassis with outdoor- and return-air, formed-steel dampers.
 4. Dampers: Galvanized steel with extruded-vinyl blade seals, flexible-metal jamb seals, and interlocking linkage.
- H. Filters: Minimum arrestance according to ASHRAE 52.1, and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.
1. Washable Foam: 70 percent arrestance and 3 MERV.
 2. Glass Fiber Treated with Adhesive: 80 percent arrestance and 5 MERV.
 3. Pleated Cotton-Polyester Media: 90 percent arrestance and 7 MERV.
- I. Hydronic Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch, rated for a minimum working pressure of 200 psig and a maximum entering-water temperature of 220 deg F. Include manual air vent and drain.
- J. Indoor Refrigerant Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch, and brazed joints at fittings. Comply with ARI 210/240, and leak test to minimum 450 psig for a minimum 300-psig working pressure. Include thermal expansion valve.
- K. Steam Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch, rated for a minimum working pressure of 75 psig.
- L. Electric-Resistance Heating Coils: Nickel-chromium heating wire, free of expansion noise and hum, mounted in ceramic inserts in a galvanized-steel housing; with fuses in terminal box for overcurrent protection and limit controls for high-temperature protection of heaters. Terminate elements in stainless-steel machine-staked terminals secured with stainless-steel hardware.
- M. Direct-Driven Fans: Double width, forward curved, centrifugal; with permanently lubricated, multispeed motor resiliently mounted in the fan inlet. Aluminum or painted-steel wheels, and painted-steel or galvanized-steel fan scrolls.
- N. Belt-Driven Fans: Double width, forward curved, centrifugal; with permanently lubricated, single-speed motor installed on an adjustable fan base resiliently mounted in the cabinet. Aluminum or painted-steel wheels, and painted-steel or galvanized-steel fan scrolls.
1. Motors: Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
- O. Remote condensing units are specified in Division 23 Section "Packaged Compressor and Condenser Units."
- P. Remote Condensing Units: Factory assembled and tested, consisting of compressors, condenser coils, fans, motors, refrigerant receiver, and operating controls. Construct, test, and rate operating condensing units according to ARI 210/240 and ASHRAE 15.
1. Casing: Steel with baked-enamel finish, removable panels for access to controls, weep holes for water drainage, and mounting holes in base.

2. Compressor: Hermetic, reciprocating type; internally isolated for vibration with factory-installed safety devices as follows:
 - a. Antirecycle timer.
 - b. High-pressure cutout.
 - c. Low-pressure cutout or loss-of-charge switch.
 - d. Internal thermal-overload protection.
 - e. Current and voltage sensitive safety devices.
 3. Compressor Motor: Start capacitor, relay, and contactor. Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
 4. Energy Efficiency: Equal to or greater than prescribed by ASHRAE/IESNA 90.1, "Energy Standard for Buildings except Low-Rise Residential Buildings."
 5. Refrigerant Piping Materials: ASTM B 743 copper tube with wrought-copper fittings and brazed joints.
 6. Refrigerant: R-407C or R-410A.
 7. Low ambient controls to permit operation down to 45 deg F.
 8. Crankcase heater.
 9. Charging and service fittings on exterior of casing.
 10. Filter dryer.
 11. Air-to-Air Heat Pump: Pilot-operated, sliding-type reversing valve with replaceable magnetic coil, and controls for air-to-air heat pump operation with supplemental heat operation.
 12. Hot-gas-bypass, constant-pressure expansion valve and controls to maintain continuous refrigeration system operation at 10 percent of full load.
 13. Condenser: Copper-tube, aluminum-fin coil, with liquid subcooler.
 14. Condenser Fan: Direct-drive, aluminum propeller fan.
 - a. Motor: Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
 15. Accessories: Polyethylene mounting base to provide a permanent foundation.
- Q. Control devices and operational sequence are specified in Division 23 Section "Instrumentation and Control for HVAC" and "Sequence of Operations for HVAC Controls."
- R. Basic Unit Controls:

1. Control voltage transformer.
 - a. Occupied Periods:
 - 1) Heating Operations: Modulate control valve. Energize electric-resistance coil] to provide heating if room temperature falls below thermostat set point.
 - 2) Humidity-Control Operations: Humidistat modulates control valve energizes electric-resistance coil to provide heating. As room temperature rises above the set point, cooling coil valve modulates to maintain room temperature.
 - b. Unoccupied Periods: Start fan and modulate control valve energize electric-resistance coil if room temperature falls below setback temperature. Humidity control is not available.

S. BAS Interface Requirements:

1. Interface relay for scheduled operation.
2. Interface relay to provide indication of fault at the central workstation.
3. Provide BAC net interface for central BAS workstation for the following functions:
 - a. Adjust set points.
 - b. Fan-coil-unit start, stop, and operating status.
 - c. Data inquiry including supply- and room-air temperature
 - d. Occupied and unoccupied schedules.

T. Electrical Connection: Factory wire motors and controls for a single electrical connection.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive fan-coil units for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in for piping and electrical connections to verify actual locations before fan-coil-unit installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install fan-coil units level and plumb.
- B. Install fan-coil units to comply with NFPA 90A.
- C. Suspend fan-coil units from structure with elastomeric hangers. Vibration isolators are specified in Division 23 Section "Vibration and Seismic Controls for HVAC Piping and Equipment."
- D. Verify locations of thermostats, humidistats, and other exposed control sensors with Drawings and room details before installation. Install devices 60 inches above finished floor.
- E. Install new filters in each fan-coil unit within two weeks after Substantial Completion.

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties. Specific connection requirements are as follows:

1. Install piping adjacent to machine to allow service and maintenance.
2. Connect piping to fan-coil-unit factory hydronic piping package. Install piping package if shipped loose.
3. Connect condensate drain to indirect waste.
 - a. Install condensate trap of adequate depth to seal against the pressure of fan. Install cleanouts in piping at changes of direction.
- B. Connect supply and return ducts to fan-coil units with flexible duct connectors specified in Division 23 Section "Air Duct Accessories." Comply with safety requirements in UL 1995 for duct connections.
- C. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect[, test, and adjust] field-assembled components and equipment installation, including connections[, and to assist in field testing]. Report results in writing.
- B. Perform the following field tests and inspections and prepare test reports:
 1. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 2. Operate electric heating elements through each stage to verify proper operation and electrical connections.
 3. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.
- C. Remove and replace malfunctioning units and retest as specified above.

3.5 ADJUSTING

- A. Adjust initial temperature and humidity set points.
- B. 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.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fan-coil units. Refer to 'General Conditions' as applicable "Demonstration and Training."

END OF SECTION 238219

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 238233

CONVECTORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Hydronic finned-tube radiators.

1.3 ACTION SUBMITTALS

- A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each type of product indicated.
- B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - 1. Plans, elevations, sections, and details.
 - 2. Details of custom-fabricated enclosures indicating dimensions.
 - 3. Location and size of each field connection.
 - 4. Location and arrangement of piping valves and specialties.
 - 5. Location and arrangement of integral controls.
 - 6. Enclosure joints, corner pieces, access doors, and other accessories.
 - 7. Wiring Diagrams: Power, signal, and control wiring.
- C. Color Samples for Initial Selection: For units with factory-applied color finishes.
- D. Color Samples for Verification: For each type of exposed finish required.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Floor plans and other details, 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, including wall construction, to which convection units will be attached.
2. Method of attaching convection units to building structure.
3. Penetrations of fire-rated wall and floor assemblies.

B. Field quality-control test reports.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For convection heating units to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

PART 2 - PRODUCTS

2.1 HOT-WATER FINNED-TUBE RADIATORS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
1. Embassy Industries, Inc.
 2. Engineered Air.
 3. Rittling, a div. of Hydro-Air Components.
 4. Rosemex.
 5. Slant/Fin.
 6. Trane.
 - 7.
- D. Performance Ratings: Rate finned-tube radiators according to Hydronics Institute's "I=B=R Testing and Rating Standard for Finned-Tube (Commercial) Radiation."
- E. Heating Elements: Copper tubing mechanically expanded into flanged collars of evenly spaced aluminum fins resting on element supports. One tube end shall be belled.
1. Average Water Temperature: 180 deg F (82 deg C)
 2. Minimum Water Velocity: 1/2 fps (0.15 m/s)

- F. Heating Elements: Steel tubing mechanically expanded into flanged collars of evenly spaced steel fins resting on element supports. Tube ends shall be threaded.
 - 1. Average Water Temperature: 180 deg F (82 deg C).
 - 2. Minimum Water Velocity: 1/2 fps (0.15 m/s).
- G. Element Supports: Ball-bearing cradle type to permit longitudinal movement on enclosure brackets.
- H. Front Panel: Minimum 0.0528-inch (1.35-mm) thick steel.
- I. Wall-Mounting Back Panel: Minimum 0.0329-inch (0.85-mm) thick steel, full height, with full-length channel support for front panel without exposed fasteners.
- J. Floor-Mounting Pedestals: Conceal insulated piping at maximum 36-inch (914-mm) spacing. Pedestal-mounting back panel shall be solid panel matching front panel. Provide stainless-steel escutcheon for floor openings at pedestals.
- K. Support Brackets: Locate at maximum 36-inch (914-mm) spacing to support front panel and element.
- L. Finish: Baked enamel finish in manufacturer's standard color as selected by Architect.
- M. Damper: Knob-operated internal damper at enclosure outlet.
- N. Access Doors: Factory made, permanently hinged with tamper-resistant fastener, minimum size 6 by 7 inches (150 by 175 mm), integral with enclosure.
- O. Enclosure Style: Flat top.
 - 1. Front Inlet Grille: Punched louver; painted to match enclosure.
 - 2. Top Outlet Grille: Punched louver; painted to match enclosure.
- P. Accessories: Filler sections, corners, relay sections, and splice plates all matching the enclosure and grille finishes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive convection heating units for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in for hydronic-piping connections to verify actual locations before convection heating unit installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 BASEBOARD RADIATOR INSTALLATION

- A. Install units level and plumb.
- B. Install baseboard radiators according to Guide 2000 - Residential Hydronic Heating.
- C. Install enclosure continuously around corners, using outside and inside corner fittings.
- D. Join sections with splice plates and filler pieces to provide continuous enclosure.
- E. Install access doors for access to valves.
- F. Install enclosure continuously from wall to wall.
- G. Terminate enclosures with manufacturer's end caps except where enclosures are indicated to extend to adjoining walls.
- H. Install valves within reach of access door provided in enclosure.
- I. Install air-seal gasket between wall and recessing flanges or front cover of fully recessed unit.
- J. Install piping within pedestals for freestanding units.

3.3 FINNED-TUBE RADIATOR INSTALLATION

- A. Install units level and plumb.
- B. Install finned-tube radiators according to Guide 2000 - Residential Hydronic Heating.
- C. Install enclosure continuously around corners, using outside and inside corner fittings.
- D. Join sections with splice plates and filler pieces to provide continuous enclosure.
- E. Install access doors for access to valves.
- F. Install enclosure continuously from wall to wall.
- G. Terminate enclosures with manufacturer's end caps, except where enclosures are indicated to extend to adjoining walls.
- H. Install valves within reach of access door provided in enclosure.
- I. Install air-seal gasket between wall and recessing flanges or front cover of fully recessed unit.
- J. Install piping within pedestals for freestanding units.

3.4 CONVECTOR INSTALLATION

- A. Install units level and plumb.

- B. Install valves within reach of access door provided in enclosure.
- C. Install air-seal gasketing between wall and recessing flanges or front cover of fully recessed unit.
- D. Install piping within pedestals for freestanding units.

3.5 FLAT-PIPE STEEL RADIATOR INSTALLATION

- A. Install units level and plumb.
- B. Install expansion compensation hoses.
- C. Install piping covers.

3.6 CONNECTIONS

- A. Piping installation requirements are specified in Division 23 Section "Hydronic Piping." Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect hot-water units and components to piping according to Division 23 Section "Hydronic Piping."
 - 1. Install shutoff valves on inlet and outlet, and balancing valve on outlet.
- C. Connect steam units and components to piping according to Division 23 Section "Steam and Condensate Heating Piping."
 - 1. Install shutoff valve on inlet; install strainer, steam trap, and shutoff valve on outlet.
- D. Install control valves as required by Division 23 Section "Instrumentation and Control for HVAC."
- E. Install piping adjacent to convection heating units to allow service and maintenance.
- F. Ground electric convection heating units according to Division 26 Section "Grounding and Bonding for Electrical Systems."
- G. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.7 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 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 convection heating unit operation.
 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- B. Remove and replace convection heating units that do not pass tests and inspections and retest as specified above.

END OF SECTION 238233

SECTION 260500
COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Division 1, Section 018113.3 – Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings.
- C. Division 1, Section 018113 – Sustainable Design Requirements (LEED Building)
- D. Division 1, Section 017419 - Construction Waste Management and Disposal
- E. Division 1, Section 018119 - Construction IAQ Requirements

1.2 SUMMARY

- A. Section Includes:
 - 1. Electrical equipment coordination and installation.
 - 2. Sleeves for raceways and cables.
 - 3. Sleeve seals.
 - 4. Grout.
 - 5. Common electrical installation requirements.

B. Energy Code Compliance

The design is in compliance with New York State Energy Code Conservation Construction Code.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

A. Product Data: For sleeve seals.

B. LEED BUILDING SUBMITTAL REQUIREMENTS:

1. Provide for all field-applied adhesives, sealants (used as fillers), and paints:
Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, paints and coatings applied on the interior of the building. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

1.5 COORDINATION

A. Coordinate arrangement, mounting, and support of electrical equipment:

1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
3. To allow right of way for piping and conduit installed at required slope.
4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.

B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

C. Coordinate location of access panels and doors for electrical items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."

D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

1.6 PERFORMANCE REQUIREMENTS

A. LEED BUILDING REQUIREMENTS

1. GENERAL REQUIREMENTS:

Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, as defined in the sections below and in related sections of the contract documents, are implemented to the fullest

The City of New York requires

extent. Substitutions, or other changes to the work proposed by the Contractor or their Subcontractors, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

2. **PERFORMANCE CRITERIA:** All field applied adhesives, sealants (used as fillers), prime painting, and finished painting shall comply with the low VOC requirements called out in Division 1, Section 018113.3 - Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, & Architectural Coatings, and Section 09900 - Interior Paint.

1.7 WORK INCLUDED

- A. **Related Work and Requirements Include:**
 1. **Requirements of Construction Waste Management, Section 017419.**
 - a. The Commissioner has established that as many of the surplus and waste material as economically feasible shall be reused, salvaged, or recycled. To that end, Electrical Work shall participate in the development of the Waste Management Plan, and collect, sort and deposit in designated containers, their waste, non-returned surplus materials and rubbish in accordance with the approved Plan.
 - b. Project Diversion Goals are stated in Section 017419 – Construction Waste Management. Electrical Work shall meet or exceed the minimum percentage of waste stated there for diversion from landfill, unless General Construction Work designates a different amount. Specific items/categories shall be in accordance with the Documents and as established in the Plan.

PART 2 - PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

- A. **Steel Pipe Sleeves:** ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. **Cast-Iron Pipe Sleeves:** Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. **Sleeves for Rectangular Openings:** Galvanized sheet steel.
 1. **Minimum Metal Thickness:**
 - a. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches thickness shall be 0.052 inch

2.2 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following, but are not limited to, the following:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Pipeline Seal and Insulator, Inc.
 3. Sealing Elements: EPDM or NBR interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 4. Pressure Plates Carbon steel. Include two for each sealing element.
 5. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

- E. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both surfaces of walls.
- F. Extend sleeves installed in floors 2 inches above finished floor level.
- G. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
 - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
- I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
- J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."
- K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

- M. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

3.3 SLEEVE-SEAL INSTALLATION

- A. Install to seal exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

3.5 WASTE MANAGEMENT

- A. Comply with the requirements established by the Contractor for General Construction Work to separate and recycle, salvage or reuse cast-offs, surplus and waste material in accordance with the Waste Management Plan.
- B. Arrange for suppliers to take back shipping and packing materials for reuse or recycling to the maximum extent economically feasible, or include them in the Waste Management Plan.

END OF SECTION 260500

SECTION 260519

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Building wires and cables rated 600 V and less.
 - 2. Connectors, splices, and terminations rated 600 V and less.
 - 3. Sleeves and sleeve seals for cables.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Qualification Data: For testing agency.
- C. Field quality-control test reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.
 - B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - C. Comply with NFPA 70.
- 1.6 COORDINATION
- A. Set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Alcan Products Corporation; Alcan Cable Division.
 2. American Insulated Wire Corp.; a Leviton Company.
 3. General Cable Corporation.
 4. Senator Wire & Cable Company.
 5. Southwire Company.
- C. Copper Conductors: Comply with NEMA WC 70.
- D. Conductor Insulation: Comply with NEMA WC 70 for Types THHN-THWN.
- E. Multiconductor Cable: Comply with NEMA WC 70 for armored cable, Type AC, metal-clad cable, Type MC with ground wire.

2.2 CONNECTORS AND SPLICES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AFC Cable Systems, Inc.
 - 2. Hubbell Power Systems, Inc.
 - 3. O-Z/Gedney; EGS Electrical Group LLC.
 - 4. 3M; Electrical Products Division.
 - 5. Tyco Electronics Corp.
- C. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

2.3 SLEEVES FOR CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.138-inch thickness as indicated and of length to suit application.
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
- B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type THHN-THWN, single conductors in raceway.

- B. Exposed Feeders: Type THHN-THWN, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-THWN, single conductors in raceway.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- E. Feeders Installed below Raised Flooring: Type THHN-THWN, single conductors in raceway.
- F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway or Armored cable, Type AC or Metal-clad cable, Type MC.
- G. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway.
- H. Branch Circuits Installed below Raised Flooring: Type THHN-THWN, single conductors in raceway.
- I. Class 1 Control Circuits: Type THHN-THWN, in raceway.
- N. Class 2 Control Circuits: Power-limited cable, concealed in building finishes.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
- B. 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.
- C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- E. Support cables according to Division 26 Section "Hangers and Supports for Electrical Systems."
- F. Identify and color-code conductors and cables according to Division 26 Section "Identification for Electrical Systems."

3.4 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 and UL 486B.
- B. Make splices 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 and tap conductor for aluminum conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.5 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07 Section "Penetration Firestopping."

3.6 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
- B. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - 3. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.
 - a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Substantial Completion.
 - b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - c. Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- D. Test Reports: Prepare a written report to record the following:
 - 1. Test procedures used.

2. Test results that comply with requirements.
 3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
- E. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 260519

SECTION 260526

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. The DDC General Conditions, section 01000, shall apply to this Section.

1.2 SUMMARY

- A. This Section includes methods and materials for grounding systems and equipment.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Field quality-control test reports.

1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
 - 1. Solid Conductors: ASTM B 3.
 - 2. Stranded Conductors: ASTM B 8.
 - 3. Tinned Conductors: ASTM B 33.

4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors, terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.

2.2 CONNECTORS

- A. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.
- B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts.
 1. Pipe Connectors: Clamp type, sized for pipe.
- C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger, unless otherwise indicated.
- B. Conductor Terminations and Connections:
 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 Structural Steel: Welded connectors.

3.2 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.

3.3 INSTALLATION

- A. Grounding Conductors: 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. Common Ground Bonding with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.
- C. 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 any adjacent parts.
 - 2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment.
 - 3. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.

3.4 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections and prepare test reports:
 - 1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 - 2. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal.
- B. Report measured ground resistances that exceed the following values:
 - 1. Power and Lighting Equipment or System with Capacity 500 kVA and Less: 10 ohms.
- C. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Commissioner promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 260533

RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing.
- B. EPDM: Ethylene-propylene-diene terpolymer rubber.
- C. FMC: Flexible metal conduit.
- D. IMC: Intermediate metal conduit.
- E. LFMC: Liquidtight flexible metal conduit.
- F. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

- A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
- B. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Custom enclosures and cabinets.
 - 2. For handholes and boxes for underground wiring, including the following:
 - a. Duct entry provisions, including locations and duct sizes.
 - b. Frame and cover design.
 - c. Grounding details.
 - d. Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.

- e. Joint details.
 - C. Coordination Drawings: Conduit routing plans, 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 in the paths of conduit groups with common supports.
 - 2. HVAC and plumbing items and architectural features in the paths of conduit groups with common supports.
 - D. Qualification Data: For professional engineer and testing agency.
 - E. Source quality-control test reports.
- 1.5 QUALITY ASSURANCE
- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - B. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 METAL CONDUIT AND TUBING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
 - 1. AFC Cable Systems, Inc.
 - 2. Alflec Inc.
 - 3. Allied Tube & Conduit; a Tyco International Ltd. Co.
 - 4. Anamet Electrical, Inc.; Anaconda Metal Hose.
 - 5. Electri-Flex Co.
 - 6. Manhattan/CDT/Cole-Flex.
 - 7. Maverick Tube Corporation.
 - 8. O-Z Gedney; a unit of General Signal.
 - 9. Wheatland Tube Company.
- B. Rigid Steel Conduit: ANSI C80.1.
- C. Aluminum Rigid Conduit: ANSI C80.5.
- D. IMC: ANSI C80.6.
- E. EMT: ANSI C80.3.

- F. FMC: Zinc-coated steel.
- G. LFMC: Flexible steel conduit with PVC jacket.
- H. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
 - 1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
 - 2. Fittings for EMT: set-screw or compression type.
- I. Joint Compound for Rigid Steel Conduit or IMC: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

2.2 METAL WIREWAYS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
 - 1. Cooper B-Line, Inc.
 - 2. Hoffman.
 - 3. Square D; Schneider Electric.
- B. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 1, unless otherwise indicated.
- C. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- D. Wireway Covers: Screw-cover type.
- E. Finish: Manufacturer's standard enamel finish.

2.3 BOXES, ENCLOSURES, AND CABINETS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
 - 1. Cooper Crouse-Hinds; Div. of Cooper Industries, Inc.
 - 2. EGS/Appleton Electric.
 - 3. Erickson Electrical Equipment Company.
 - 4. Hoffman.
 - 5. Hubbell Incorporated; Killark Electric Manufacturing Co. Division.
 - 6. O-Z/Gedney; a unit of General Signal.
 - 7. RACO; a Hubbell Company.
 - 8. Spring City Electrical Manufacturing Company.

9. Thomas & Betts Corporation.
10. Walker Systems, Inc.; Wiremold Company (The).

- B. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
- C. Cast-Metal Outlet and Device Boxes: NEMA FB 1, **ferrous alloy** Type FD, with gasketed cover.
- D. Metal Floor Boxes: Cast or sheet metal fully adjustable, rectangular.
- E. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- F. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, cast aluminum with gasketed cover.
- G. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.
1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
- H. Cabinets:
1. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 2. Hinged door in front cover with flush latch and concealed hinge.
 3. Key latch to match panelboards.
 4. Metal barriers to separate wiring of different systems and voltage.
 5. Accessory feet where required for freestanding equipment.

2.5 SLEEVES FOR RACEWAYS

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052-inch thickness as indicated and of length to suit application.
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

2.6 SLEEVE SEALS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:

1. Advance Products & Systems, Inc.
2. Calpico, Inc.
3. Metraflex Co.
4. Pipeline Seal and Insulator, Inc.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below, unless otherwise indicated:

1. Exposed Conduit: Rigid steel conduit.
2. Concealed Conduit, Aboveground: Rigid steel conduit.
3. Underground Conduit: Rigid steel conduit, direct buried.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R

- B. Comply with the following indoor applications, unless otherwise indicated:

1. Exposed, Not Subject to Physical Damage: EMT.
2. Exposed, Not Subject to Severe Physical Damage: EMT.
3. Exposed and Subject to Severe Physical Damage: Rigid steel conduit. Includes raceways in the following locations:
 - a. Loading dock.
 - b. Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
 - c. Mechanical rooms.
4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
6. Damp or Wet Locations: Rigid steel conduit.
10. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4 in damp or wet locations.

- C. Minimum Raceway Size: 3/4-inch trade size.

- D. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.

- E. Do not install aluminum conduits in contact with concrete.

3.2 INSTALLATION

- A. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
- B. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- C. Complete raceway installation before starting conductor installation.
- D. (Not Used)
- E. Arrange stub-ups so curved portions of bends are not visible above the finished slab.
- F. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.
- G. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
- H. Raceways Embedded in Slabs:
 - 1. Run conduit larger than 1-inch trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
 - 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
- I. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- J. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.
- K. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire.
- L. Raceways for Optical Fiber and Communications Cable: Install raceways, metallic rigid and flexible, as follows:
 - 1. 3/4-Inch Trade Size and Smaller: Install raceways in maximum lengths of 50 feet

2. 1-Inch Trade Size and Larger: Install raceways in maximum lengths of 75 feet.
 3. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.
- M. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. Install raceway sealing fittings at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 2. Where otherwise required by NFPA 70.
- N. Flexible Conduit Connections: Use maximum of 72 inches of flexible conduit for recessed and semirecessed lighting fixtures, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
1. Use LFMC in damp or wet locations.
- O. 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.
- P. Set metal floor boxes level and flush with finished floor surface.

3.3 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Rectangular Sleeve Minimum Metal Thickness:
1. For sleeve cross-section rectangle perimeter less than 50 inches and no side greater than 16 inches, thickness shall be 0.052 inch.
 2. For sleeve cross-section rectangle perimeter equal to, or greater than, 50 inches and 1 or more sides equal to, or greater than, 16 inches, thickness shall be 0.138 inch.
- E. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.

- F. Cut sleeves to length for mounting flush with both surfaces of walls.
- G. Extend sleeves installed in floors 2 inches above finished floor level.
- H. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway unless sleeve seal is to be installed.
- I. Seal space outside of sleeves with grout for penetrations of concrete and masonry.
- J. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway, using joint sealant appropriate for size, depth, and location of joint.
- K. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway penetrations. Install sleeves and seal with firestop materials.
- L. Roof-Penetration Sleeves: Seal penetration of individual raceways with flexible, boot-type flashing units applied in coordination with roofing work.
- M. Aboveground, Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- N. Underground, Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch annular clear space between raceway and sleeve for installing mechanical sleeve seals.

3.6 SLEEVE-SEAL INSTALLATION

- A. Install to seal underground, exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for raceway material and size. Position raceway in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.7 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

3.8 PROTECTION

- A. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Substantial Completion.
 - 1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
 - 2. Repair damage to paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 260553

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. The DDC General Conditions, section 01000, shall apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Identification for raceway and metal-clad cable.
 - 2. Identification for conductors and communication and control cable.
 - 3. Warning labels and signs.
 - 4. Instruction signs.
 - 5. Equipment identification labels.
 - 6. Miscellaneous identification products.

1.3 SUBMITTALS

- A. Product Data: For each electrical identification product indicated.
- B. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.
- C. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.

1.4 QUALITY ASSURANCE

- A. Comply with ANSI A13.1 and ANSI C2.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.145.

1.5 COORDINATION

- A. Coordinate identification names, abbreviations, colors, and other features with requirements in the Contract Documents, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual, and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.
- B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.
- C. Coordinate installation of identifying devices with location of access panels and doors.
- D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 RACEWAY AND METAL-CLAD CABLE IDENTIFICATION MATERIALS

- A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
- B. Color for Printed Legend:
 - 1. Power Circuits: Black letters on an orange field.
 - 2. Legend: Indicate system or service and voltage, if applicable.
- C. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
- D. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeves, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- E. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeves, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- F. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; 2 inches wide; compounded for outdoor use.

2.2 WARNING LABELS AND SIGNS

- A. Comply with NFPA 70 and 29 CFR 1910.145.

- B. Self-Adhesive Warning Labels: Factory printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment, unless otherwise indicated.
- C. Baked-Enamel Warning Signs: Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application. 1/4-inch grommets in corners for mounting. Nominal size, 7 by 10 inches.
- D. Metal-Backed, Butyrate Warning Signs: Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors, legend, and size required for application. 1/4-inch grommets in corners for mounting. Nominal size, 10 by 14 inches.
- E. Warning label and sign shall include, but are not limited to, the following legends:
 - 1. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
 - 2. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES."
 - 3. "ELECTRICAL ROOM - NO STORAGE PERMITTED"

2.3 INSTRUCTION SIGNS

- A. Engraved, laminated acrylic or melamine plastic, minimum 1/16 inch thick for signs up to 20 sq. in. and 1/8 inch thick for larger sizes.
 - 1. Engraved legend with black letters on white face.
 - 2. Punched or drilled for mechanical fasteners.
 - 3. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.4 EQUIPMENT IDENTIFICATION LABELS

- A. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch.
- B. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be 1 inch .

2.5 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Cable Ties: Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties.
 - 1. Minimum Width: 3/16 inch
 - 2. Tensile Strength: 50 lb (), minimum.

3. Temperature Range: Minus 40 to plus 185 deg F.
 4. Color: Black, except where used for color-coding.
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A: Identify with orange self-adhesive vinyl label.
- B. Power-Circuit Conductor Identification: For primary and secondary conductors No. 1/0 AWG and larger in vaults, pull and junction boxes, manholes, and handholes use color-coding conductor tape. Identify source and circuit number of each set of conductors. For single conductor cables, identify phase in addition to the above.
- C. Branch-Circuit Conductor Identification: Where there are conductors for more than three branch circuits in same junction or pull box, use color-coding conductor tape. Identify each ungrounded conductor according to source and circuit number.
- D. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, signal, sound, intercommunications, voice, and data connections.
1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 2. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 3. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and Operation and Maintenance Manual.
- E. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Comply with 29 CFR 1910.145 and apply self-adhesive warning labels. Identify system voltage with black letters on an orange background. Apply to exterior of door, cover, or other access.
1. 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.
 2. Equipment Requiring Workspace Clearance According to NFPA 70: Unless otherwise indicated, apply to door or cover of equipment but not on flush panelboards and similar equipment in finished spaces.
- F. Instruction Signs:

1. Operating Instructions: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
 2. Emergency Operating Instructions: Install instruction signs with white legend on a red background with minimum 3/8-inch high letters for emergency instructions at equipment used for power transfer.
- G. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
1. Labeling Instructions:
 - a. Indoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch high letters on 1-1/2-inch- high label; where 2 lines of text are required, use labels 2 inches high.
 - b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
 - c. Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 2. Equipment to Be Labeled:
 - a. Panelboards, electrical cabinets, and enclosures.
 - b. Access doors and panels for concealed electrical items.
 - c. Emergency system boxes and enclosures.
 - d. Disconnect switches.
 - e. Power transfer equipment.
 - f. Power-generating units.

3.2 INSTALLATION

- A. Verify identity of each item before installing identification products.
- B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
- C. Apply identification devices to surfaces that require finish after completing finish work.
- D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
- E. System Identification Color Banding for Raceways and Cables: Each color band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and

floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

- F. Color-Coding for Phase Identification: Use the colors listed below for ungrounded service, feeder, and branch-circuit conductors.
1. Color shall be factory applied or, for sizes larger than No. 10 AWG if authorities having jurisdiction permit, field applied.
 2. Colors for 208/120-V Circuits:
 - a. Phase A: Black.
 - b. Phase B: Red.
 - c. Phase C: Blue.
 3. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
- G. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.
- H. Painted Identification: Prepare surface and apply paint according to Division 9 painting Sections.

END OF SECTION 260553

SECTION 260923
LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following lighting control devices:
 - 1. Time switches.
 - 2. Indoor occupancy sensors.
 - 3. Lighting contactors.
 - 4. Preset Lighting Control System.
 - 5. Conductors and Cables.
 - 6. "Appendix A" Lighting Control Design Narrative.
- B. Related Sections include the following:
 - 1. Division 26 Section "Wiring Devices" for wall-box dimmers, wall-switch occupancy sensors, and manual light switches.
 - 2. Division 26 Section 26 51 13 "Architectural luminaries" for wall-box dimmers, wall-switch occupancy sensors, and manual light switches.

1.3 DEFINITIONS

- A. LED: Light-emitting diode.
- B. PIR: Passive infrared.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show installation details for occupancy and light-level sensors.
 - 1. Interconnection diagrams showing field-installed wiring.

- C. Field quality-control test reports.
- D. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals.
- E. Manufacturer shall submit a written statement confirming that the products submitted meet every aspect of the performance described in the specifications, drawings and the Lighting Control Design Intent Narrative (Appendix A). If there are any discrepancies, manufacturer shall note them and describe how the submitted product differs and how it the performance is met in a different method than the description in the basis of design.
- F. The Owner and Architect reserve the right to change any of the zone designations for the lighting control circuits up until the date the final submittal responses are due back to the Contractor. These shall be considered "clarifications" as long as the overall quantity, wattage and number of zones and system elements remain the same. Zones designated as spares may be utilized at this time without incurring any additional costs to the project.
- G. These controls have been designed to meet requirements for the NYS Energy Conservation Code and LEED. Any significant variations from the specified performance will require the proposed manufacturer to generate submittals of energy consumption and cost benefit analyses to demonstrate equivalency.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.6 COORDINATION

- 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 system, and partition assemblies.

PART 2 - PRODUCTS

2.1 TIME SWITCHES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or approved equal:
 - 1. Area Lighting Research, Inc.; Tyco Electronics.
 - 2. Grasslin Controls Corporation; a GE Industrial Systems Company.
 - 3. Intermatic, Inc.

4. Leviton Mfg. Company Inc.
5. Lightolier Controls; a Genlyte Company.
6. Lithonia Lighting; Acuity Lighting Group, Inc.
7. Paragon Electric Co.; Invensys Climate Controls.
8. Square D; Schneider Electric.
9. TORK.
10. Touch-Plate, Inc.
11. Watt Stopper (The).

D. Electronic Time Switches: Electronic, solid-state programmable units with alphanumeric display; complying with UL 917.

1. Contact Configuration: DPST.
2. Contact Rating: 30-A inductive or resistive, 240-V ac.
3. Program: 8 on-off set points on a 24-hour schedule and an annual holiday schedule that overrides the weekly operation on holidays.
4. Program: 2 on-off set points on a 24-hour schedule, allowing different set points for each day of the week and an annual holiday schedule that overrides the weekly operation on holidays.
5. Astronomic Time: All channels.
6. Battery Backup: For schedules and time clock.

E. Electromechanical-Dial Time Switches: Type complying with UL 917.

1. Contact Configuration: DPST.
2. Contact Rating: 30-A inductive or resistive, 240-V ac, (20-A ballast load).
3. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program.
4. Astronomic time dial.
5. Eight-Day Program: Uniquely programmable for each weekday and holidays.
6. Skip-a-day mode.
7. Wound-spring reserve carryover mechanism to keep time during power failures, minimum of 16 hours.

2.2 (NOT USED)

2.3 INDOOR PHOTOELECTRIC SWITCHES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Watt Stopper (The).
 2. Area Lighting Research, Inc.; Tyco Electronics.

3. Eaton Electrical Inc; Cutler-Hammer Products.
4. Grasslin Controls Corporation; a GE Industrial Systems Company.
5. Intermatic, Inc.
6. Paragon Electric Co.; Invensys Climate Controls.
7. Square D; Schneider Electric.
8. TORK.

C. Basis-of-Design Product:

1. Watt Stopper (The).

D. Ceiling-Mounted Photoelectric Switch: Solid-state, light-level sensor unit, with separate relay unit, to detect changes in lighting levels that are perceived by the eye. Cadmium sulfide photoresistors are not acceptable.

1. Sensor Output: Contacts rated to operate the associated relay, complying with UL 773A. Sensor shall be powered from the relay unit.
2. Relay Unit: Dry contacts rated for 20-A ballast load at 120-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
3. Light-Level Monitoring Range: 10 to 200 fc, with an adjustment for turn-on and turn-off levels within that range.
4. Time Delay: Adjustable from 5 to 300 seconds to prevent cycling, with deadband adjustment.
5. Indicator: Two LEDs to indicate the beginning of on-off cycles.

2.4 INDOOR OCCUPANCY SENSORS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Watt Stopper (The).
2. Leviton Mfg. Company Inc.
3. Sensor Switch, Inc.

B. Basis-of-Design Product:

1. Watt Stopper (The).

C. Sensors shall be preset to operate in the Manual-on, Automatic off mode, such that the automatic off can never be overridden, even if the occupants turns off the lights manually. In the case of a ceiling occupancy sensor, supply electronic momentary contact switches to provide the manual-on function. All switches shall be labeled to indicate the zone controlled.

D. General Description: Wall- or ceiling-mounting, solid-state units with a separate relay unit.

1. Operation: Unless otherwise indicated, turn lights on when covered area is occupied and/or off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
 2. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit.
 3. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
 4. Mounting:
 - a. Sensor: Suitable for mounting in any position on a standard 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.
 5. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.
 6. Bypass Switch: Override the on function in case of sensor failure.
 7. Automatic Light-Level Sensor: Adjustable from 2 to 200 fc; keep lighting off when selected lighting level is present.
- E. PIR Type: Ceiling mounting; detect occupancy by sensing a combination of heat and movement in area of coverage.
1. 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. in..
 2. Detection Coverage (Room): Detect occupancy anywhere in a circular area of 1000 sq. ft. when mounted on a 96-inch- high ceiling.
 3. Detection Coverage (Corridor): Detect occupancy within 90 feet when mounted on a 10-foot- high ceiling.
- F. Ultrasonic Type: Ceiling mounting; detect occupancy by sensing a change in pattern of reflected ultrasonic energy in area of coverage.
1. Detector Sensitivity: Detect a person of average size and weight moving not less than 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/s.
 2. Detection Coverage (Small Room): Detect occupancy anywhere within a circular area of 600 sq. ft. when mounted on a 96-inch- high ceiling.
 3. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of 1000 sq. ft. when mounted on a 96-inch- high ceiling.
 4. Detection Coverage (Large Room): Detect occupancy anywhere within a circular area of 2000 sq. ft. when mounted on a 96-inch- high ceiling.
 5. Detection Coverage (Corridor): Detect occupancy anywhere within 90 feet when mounted on a 10-foot- high ceiling in a corridor not wider than 14 feet .

- G. Dual-Technology Type: Ceiling mounting; detect occupancy by using a combination of PIR and ultrasonic detection methods in area of coverage. Particular technology or combination of technologies that controls on-off functions shall be 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. in. and detect a person of average size and weight moving not less than 12 inches in either a horizontal or a vertical manner at an approximate speed of 12 inches/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.

2.5 (NOT USED)

2.6 LIGHTING CONTACTORS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:
1. ASCO Power Technologies, LP; a division of Emerson Electric Co.
 2. Eaton Electrical Inc.; Cutler-Hammer Products.
 3. GE Industrial Systems; Total Lighting Control.
 4. Square D; Schneider Electric.
 5. Watt Stopper (The).
- D. Description: Electrically operated and mechanically held, combination type with fusible switch, complying with NEMA ICS 2 and UL 508.
1. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less total harmonic distortion of normal load current).
 2. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
 3. Enclosure: Comply with NEMA 250.
 4. Provide with control and pilot devices as scheduled, matching the NEMA type specified for the enclosure.

- E. BAS Interface: Provide hardware interface to enable the BAS to monitor and control lighting contactors.

1. Monitoring: On-off status,.
2. Control: On-off operation.

2.7 PRESET LIGHTING CONTROL SYSTEM (GALLERY C).

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. LUTRON
2. LEVITON
3. GENERAL ELECTRIC
4. SQUARE D

- B. Basis-of-Design Product:

1. Watt Stopper (The).

- C. Engraved or etched labeling is required. Submit template with shop drawings.

- D. Verify compatibility between dimming ballasts and preset control system.

- E. Performance Requirements: Suitable for operation in ambient temperatures ranging from minus 40 to plus 130 deg F, rated as raintight according to UL 773A.

A pre-set system with multiple zones for dimming and switching allowing up to eight pre-set scenes, including "gallery", "classroom", "movie", "party" and "cleaning", should be used. All fixtures in Gallery C including the linear uplights, track lights, decorative sconces, downlights, and steplight shall be controlled by the pre-set system.

Fluorescent uplights integrated in the track system will provide the ambient light for the gallery and should be controlled via one dimming (down to at least 5%). Each continuous run length of track along the bottom of the luminaire shall be equipped in dedicated current limiter 25 watts per linear foot. Each continuous run of track shall be on a single or dual control zone and switch on/off. Track shall not be connected to dimming controls.

2.8 CONDUCTORS AND CABLES

- A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- B. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."
- C. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 AWG. Comply with requirements in Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

PART 3 - EXECUTION

NYS Energy Code and ASHRAE/IESNA Std. 90.1 have mandatory requirements for lighting controls. Lighting fixtures must be turned off automatically whenever spaces are unoccupied.

3.1 SENSOR INSTALLATION

- A. 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 written instructions.

3.2 CONTACTOR INSTALLATION

- 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.

3.3 WIRING INSTALLATION

- A. Wiring Method: Comply with Division 26 Section "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size shall be 3/4 inch.
- B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- C. Size conductors according to lighting control device manufacturer's written instructions, unless otherwise indicated.
- D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.4 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
 - 1. After installing time switches and sensors, and after electrical circuitry has been energized, adjust and test for compliance with requirements.
 - 2. Operational Test: Verify operation of each lighting control device, and adjust time delays.
- B. Lighting control devices that fail tests and inspections are defective work.

3.5 ADJUSTING

- A. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting sensors to suit occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train maintenance personnel to adjust, operate, and maintain lighting control devices. Refer to General Conditions for minimum Demonstration and Training requirements.

3.7 APPENDIX A – LIGHTING CONTROL DESIGN NARRATIVE

The following describes the control intent of the lighting system for the Bronx River Arts Center, as reflected in the drawings and documentation. This summary is meant to guide the contractor and control manufacturers in providing a complete system that meets the intent of the design in every way. Please refer to the lighting layouts for lighting control zones.

Lights must be turned off automatically whenever spaces are unoccupied as per NYS Energy Code and ASHRAE/IESNA Std. 90.1/ LEED requirements.

Lights connected to the emergency circuit should be fitted with battery back-up packs.

- A. Galleries:
Fluorescent uplights integrated in the track system will provide the ambient light for the galleries and should be controlled via one dimming zone per gallery (Galleries A,

B, C) so the light on the ceiling is uniform. The fluorescent lamps shall dim from 100% down to at least 5%.

All continuous run length of track along the bottom of the luminaire shall be equipped in a dedicated current limiter allowing approximately 25 watts per linear foot.

Each continuous run of track shall be on a single or dual control zone switched on/off.

Gallery C will also be used as a multipurpose room. Pre-set system with multiple zones for dimming and switching shall be provided. System shall allow up to eight pre-set scenes, including "gallery", "classroom", "movie", "party" and "cleaning" etc. Dual-circuit track is specified for the East end of the room, for additional performance lights.

A locked central control box shall be provided on the ground floor for owner turn on and early turn off of selected circuits, and as overrides to an automatic astronomical time clock.

B. Lobbies:

Lighting in the first floor lobby shall be controlled separately from the upper floors. Occupancy sensors shall be provided for upper elevator lobbies.

C. Main Stairway:

Wall mounted linear fluorescent lights and decorative compact fluorescent sconces shall switch on/off together. The linear fluorescents are specified with EM battery backup packs and will be used for emergency lighting.

D. Lease Space:

Two-lamp linear fluorescent pendants are specified as factory-wired for bi-level switching so that 1 or both lamps can be switched on depending on the amount of daylight in the room, or the choice of the occupant. Vacancy sensors shall be provided in order to turn all lights off in case the space is unoccupied. Vacancy sensors with associated power packs shall be connected to an electronic momentary contact switches. Manual action will be required (press switch) in order to switch lights on.

E. Offices:

Two lamp linear fluorescent pendants are specified as factory-wired for bi-level switching so that 1 or both lamps in each fixture can be switched on depending on the amount of daylight in the room. Vacancy sensors with power packs shall be used in each office so that the fixtures must be turned on manually but will turn off automatically when the space is not occupied.

F. Multi-Purpose Room (2nd floor):

The 4' diameter F4 fixtures are specified as factory-wired for bi-level switching allowing either 3 or 6 lamps to be switched on. Track lighting for Art Work shall be installed at East wall of the space. Vacancy sensors with power packs shall be used for these lighting fixtures so that the fixtures must be turned on manually but will turn off automatically when the space is not occupied. The linear fluorescent lighting fixtures will lit the exit pathway. Separate Occupancy sensors shall be provided for these lighting fixtures.

G. Computer Lab:

Two-lamp linear fluorescent are specified as wired for bi-level switching so that 1 or both lamps can be switched on depending on the amount of daylight in the room, for a total of 3 zones as shown. All zones should be controlled by ultrasonic vacancy sensors so that the fixtures must be switched on manually but will turn off automatically when the space is not occupied.

H. Dark Room:

Linear fluorescent troffers shall be used when red photographic development is not in progress. Turning on the fluorescent troffers should automatically turn off the red development lights. These fixtures are zoned separately from the dark room "safe lights" that will be used during the photographic development process. When the safe lights are switched on, a light outside the dark room reading "IN USE" shall also switch on. Compact fluorescent steplights shall be controlled with the safe light fixtures, providing low level light for the entry to the dark room. The safe lights could be controlled by an automatic-on occupancy sensor that detects a person entering the room. The cleaning lights should be connected to a ceiling mounted vacancy sensor with manual switch protected inside the room.

I. Studios:

Indirect linear fluorescent pendants are zoned so that the row adjacent to the window is controlled separately from the interior row. When daylight is present, turning the interior row of lights on can help balance out the light distribution on the ceiling. Track is on a separate zone allowing for flexibility with task lighting. All track shall have a 3 amp current limiter allowing up to 360 watts of light to be used per track run. One ceiling-mounted vacancy sensor per studio is required to switch all lights off when the space is not in use, combined with three momentary-contact on/off switches.

J. 3rd Floor Corridor:

Lights in the corridor are controlled by the clock separately from the lobby and lounge lighting. Lobby lighting and part of hallway lights are connected to long range ceiling-mounted occupancy sensor.

K. 3rd floor Lounge:

Fluorescent lights in the lounge are on a separate zone, connected to vacancy sensors.

Workshops:

The direct pendants in each workshop should be controlled independently of the other workshop. In each workshop, the pendants shall be wired for bi-level switching allowing 3 or 6 lamps to be switched on, or the fixture to remain off. Vacancy sensors should keep most lights off when spaces are not occupied. Photocells shall prevent zone "e3" and "e7" closest to the windows from being on at full output during daylight hours. Vacancy sensors shall take over control for those two zones for evening use.

L. Restrooms, Storage, MEP:

All nondaylit restroom, storage, and MEP rooms shall have occupancy sensors so that the lights will turn on and off automatically.

Closets within offices:

For storage closets located within offices, lights shall be activated door contact switch.

M. Exterior:

Low level LED lights around the perimeter of the roof are provided for use during parties and events. This zone shall be remotely controlled via switch with an indicator light located in an administrative office. Facade lighting can be turned on by a time clock at night to bring attention to the building. All exterior lighting should be controlled by astronomical time clocks to prevent activation during daylight hours.

END OF SECTION 260923

SECTION 262416
PANELBOARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. The DDC General Conditions, section 01000, shall apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Distribution panelboards.
 - 2. Lighting and appliance branch-circuit panelboards.

1.3 SUBMITTALS

- A. Product Data: For each type of panelboard, switching and overcurrent protective device, transient voltage suppression device, accessory, and component indicated. 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. Show tabulations of installed devices, equipment features, and ratings.
 - 2. Detail enclosure types and details for types other than NEMA 250, Type 1.
 - 3. Detail bus configuration, current, and voltage ratings.
 - 4. Short-circuit current rating of panelboards and overcurrent protective devices.
 - 5. Include evidence of NRTL listing for series rating of installed devices.
 - 6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
 - 7. Include wiring diagrams for power, signal, and control wiring.
 - 8. 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.
- C. Field Quality-Control Reports:
 - 1. Test procedures used.
 - 2. Test results that comply with requirements.

3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.
- D. Panelboard Schedules: For installation in panelboards. Submit final versions after load balancing
- E. Operation and Maintenance Data: For panelboards and components to include in emergency, operation, and maintenance manuals. In addition to items specified in General Conditions, include the following:
 1. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
 2. Time-current curves, including selectable ranges for each type of overcurrent protective device that allows adjustments.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain panelboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- 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. Comply with NEMA PB 1.
- E. Comply with NFPA 70.

1.5 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.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations:
 1. Do not deliver or install panelboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above panelboards is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:

- a. Ambient Temperature: Not exceeding minus 22 deg F to plus 104 deg F.
- b. Altitude: Not exceeding 6600 feet.

- B. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures within limits specified.
2. Altitude not exceeding 6600 feet.

1.7 COORDINATION

- A. 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.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace transient voltage suppression devices that fail in materials or workmanship within specified warranty period.
 1. Warranty Period: Five years from date of Substantial Completion.

1.9 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Keys: Two spares for each type of panelboard cabinet lock.
 2. Circuit Breakers Including GFCI and Ground Fault Equipment Protection (GFEP) Types: Two spares for each panelboard.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS

- A. Enclosures: Flush- and surface-mounted cabinets.
 1. Rated for environmental conditions at installed location.
 - a. Indoor Dry and Clean Locations: NEMA 250, Type 1.

- b. Outdoor Locations: NEMA 250, Type 3R.
- 2. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box.
- 3. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover.
- 4. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.
- 5. Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
- 6. Finishes:
 - a. Panels and Trim: 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: Same finish as panels and trim.
 - c. Fungus Proofing: Permanent fungicidal treatment for overcurrent protective devices and other components.
- 7. Directory Card: Inside panelboard door, mounted in metal frame with transparent protective cover.
- B. Incoming Mains Location: Top and bottom.
- C. Phase, Neutral, and Ground Buses:
 - 1. Material: Hard-drawn copper, 98 percent conductivity.
 - 2. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
- D. Conductor Connectors: Suitable for use with conductor material and sizes.
 - 1. Material: Hard-drawn copper, 98 percent conductivity.
 - 2. Main and Neutral Lugs: Mechanical type.
 - 3. Ground Lugs and Bus-Configured Terminators: Mechanical type.
 - 4. Subfeed (Double) Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.
- E. Future Devices: Mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
- F. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals.

2.2 DISTRIBUTION PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 3. Siemens Energy & Automation, Inc.
 4. Square D; a brand of Schneider Electric.
 5. Electro Tech.
 6. All City Switchboard Corp.
 7. Metropolitan Electric Mfg. Co.
 8. Electric Switchboard Co.
 9. Galaxy Switchgear Industries.
- B. Panelboards: NEMA PB 1, power and feeder distribution type.
- C. Doors: Door-in-door trim, secured with vault-type latch with tumbler lock; keyed alike,
1. For doors more than 36 inches high, provide two latches, keyed alike.
- D. Mains: Lugs only.
- E. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.
- F. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers.

2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 3. Siemens Energy & Automation, Inc.
 4. Square D; a brand of Schneider Electric.
 5. Electro Tech.
 6. All City Switchboard Corp.
 7. Metropolitan Electric Mfg. Co.
 8. Electric Switchboard Co.
- B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
- C. Mains: lugs only.
- D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
- E. Doors: Door-in-door trim, secured with flush latch with tumbler lock; keyed alike.

- F. Column-Type Panelboards: Narrow gutter extension, with cover, to overhead junction box equipped with ground and neutral terminal buses.

2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Eaton Electrical Inc.; Cutler-Hammer Business Unit.
 2. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 3. Siemens Energy & Automation, Inc.
 4. Square D; a brand of Schneider Electric.
- B. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
 3. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
 4. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).
 5. Arc-Fault Circuit Interrupter (AFCI) Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
 6. Molded-Case Circuit-Breaker (MCCB) Features and Accessories:
 - a. Standard frame sizes, trip ratings, and number of poles.
 - b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
 - c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
 - d. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.

2.5 PANELBOARD SUPPRESSORS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Current Technology; a subsidiary of Danahar Corporation.
 2. Eaton Electrical Inc.; Cutler-Hammer Business Unit.

3. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
 4. Liebert Corporation.
 5. Siemens Energy & Automation, Inc.
 6. Square D; a brand of Schneider Electric.
- B. Surge Protection Device: IEEE C62.41-compliant, integrally mounted, solid-state, parallel-connected, non-modular type, with sine-wave tracking suppression and filtering modules, UL 1449, second edition, short-circuit current rating matching or exceeding the panelboard short-circuit rating, and with the following features and accessories:
1. Accessories:
 - a. LED indicator lights for power and protection status.
 - b. Audible alarm, with silencing switch, to indicate when protection has failed.
 - c. One set of dry contacts rated at 5 A and 250-V ac, for remote monitoring of protection status.

2.6 ACCESSORY COMPONENTS AND FEATURES

- A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine panelboards before installation. Reject panelboards that are damaged or rusted or have been subjected to water saturation.
- B. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install panelboards and accessories according to NECA 407.
- B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.
- C. Mount top of trim 90 inches above finished floor unless otherwise indicated.
- D. Mount panelboard cabinet plumb and rigid without distortion of box. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.

- E. Install overcurrent protective devices and controllers not already factory installed.
 - 1. Set field-adjustable, circuit-breaker trip ranges.
- F. Install filler plates in unused spaces.
- G. Stub four 1-inch empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch empty conduits into raised floor space or below slab not on grade.
- H. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.
- I. Comply with NECA 1.

3.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with Division 16 Section "Electrical Identification."
- B. Create a directory to indicate installed circuit loads after balancing panelboard loads; incorporate final room designations. Obtain approval before installing. Use a computer or typewriter to create directory; handwritten directories are not acceptable.
- C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Division 16 Section "Electrical Identification."
- D. Device Nameplates: Label each branch circuit device in distribution panelboards with a nameplate complying with requirements for identification specified in Division 16 Section "Electrical Identification."

3.4 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. Tests and Inspections:
 - 1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. 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.
- C. Panelboards will be considered defective if they do not pass tests and inspections.

- D. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

- A. Adjust moving parts and operable component to function smoothly, and lubricate as recommended by manufacturer.
- B. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes.
 - 1. Measure as directed during period of normal system loading.
 - 2. Perform load-balancing circuit changes outside normal occupancy/working schedule of the facility and at time directed. Avoid disrupting critical 24-hour services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
 - 3. After circuit changes, recheck loads during normal load period. Record all load readings before and after changes and submit test records.
 - 4. Tolerance: Difference exceeding 20 percent between phase loads, within a panelboard, is not acceptable. Rebalance and recheck as necessary to meet this minimum requirement.

END OF SECTION 262416

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 262713
ELECTRICITY METERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes equipment for electricity metering by utility company.

1.3 DEFINITIONS

- A. KY Pulse: Term used by the metering industry to describe a method of measuring consumption of electricity that is based on a relay opening and closing in response to the rotation of the disk in the meter.
- B. PC: Personal computer.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For electricity-metering equipment.
 - 1. Dimensioned plans and sections or elevation layouts.
 - 2. Wiring 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.
- C. Field quality-control reports.

1.5 QUALITY ASSURANCE

- 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.

1.6 PROJECT CONDITIONS

- A. Interruption of Existing Electrical Service: Do not interrupt electrical 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 electrical service according to requirements indicated:
 - 1. Notify Construction Manager no fewer than two days in advance of proposed interruption of electrical service.
 - 2. Do not proceed with interruption of electrical service without Construction Manager's written permission.

1.7 COORDINATION

- A. Electrical Service Connections: Coordinate with utility companies and components they furnish as follows:
 - 1. Comply with requirements of utilities providing electrical power services.
 - 2. Coordinate installation and connection of utilities and services, including provision for electricity-metering components.

PART 2 - PRODUCTS

2.1 EQUIPMENT FOR ELECTRICITY METERING BY UTILITY COMPANY

- A. Meters will be furnished by utility company.
- B. Current-Transformer Cabinets: Comply with requirements of electrical-power utility company.
- C. Meter Sockets: Comply with requirements of electrical-power utility company.
- D. Meter Sockets: Steady-state and short-circuit current ratings shall meet indicated circuit ratings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with equipment installation requirements in NECA 1.
- B. Install meters furnished by utility company. Install raceways and equipment according to utility company's written requirements. Provide empty conduits for metering leads and extend grounding connections as required by utility company.
- C. Install modular meter center according to NECA 400 switchboard installation requirements.

3.2 IDENTIFICATION

- A. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."
 - 1. Series Combination Warning Label: Self-adhesive type, with text as required by NFPA 70.
 - 2. Equipment Identification Labels: Adhesive film labels with clear protective overlay. For residential meters, provide an additional card holder suitable for printed, weather-resistant card with occupant's name.

3.3 FIELD QUALITY CONTROL

- A. 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.
- B. Tests and Inspections:
 - 1. Connect a load of known kilowatt rating, 2 kW minimum, to a circuit supplied by metered feeder.
 - 2. Turn off circuits supplied by metered feeder and secure them in off condition.
 - 3. Run test load continuously for eight hours minimum, or longer, to obtain a measurable meter indication. Use test-load placement and setting that ensures continuous, safe operation.
 - 4. Check and record meter reading at end of test period and compare with actual electricity used, based on test-load rating, duration of test, and sample measurements of supply voltage at test-load connection. Record test results.

- C. Electricity metering will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION 262713

SECTION 262726
WIRING DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. The DDC General Conditions, section 01000, shall apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Receptacles, receptacles with integral GFCI, and associated device plates.
 - 2. Twist-locking receptacles.
 - 3. Wall-box motion sensors.
 - 4. Snap switches and wall-box dimmers.
 - 5. Solid-state fan speed controls.
 - 6. Wall-switch and exterior occupancy sensors.
 - 7. Communications outlets.
 - 8. Pendant cord-connector devices.
 - 9. Cord and plug sets.
 - 10. Floor service outlets, poke-through assemblies and multioutlet assemblies.

1.3 DEFINITIONS

- A. EMI: Electromagnetic interference.
- B. GFCI: Ground-fault circuit interrupter.
- C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
- D. TVSS: Transient voltage surge suppressor.
- E. UTP: Unshielded twisted pair.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.

- B. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
- C. Samples: One for each type of device and wall plate specified, in each color specified.
- D. Field quality-control test reports.
- E. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

1.6 COORDINATION

- A. Receptacles for Equipment Furnished by others: Match plug configurations.
 - 1. Cord and Plug Sets: Match equipment requirements.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described in subparagraphs below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Service Outlet Assemblies: One for every 10, but no fewer than one.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Provide product of the following, manufacturers or approved equal:
 - 1. Cooper Wiring Devices; a division of Cooper Industries, Inc. (Cooper).
 - 2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
 - 3. Leviton Mfg. Company Inc. (Leviton).

4. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).

2.2 STRAIGHT BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

- a. Cooper; 5351 (single), 5352 (duplex).
- b. Hubbell; HBL5351 (single), CR5352 (duplex).
- c. Leviton; 5891 (single), 5352 (duplex).
- d. Pass & Seymour; 5381 (single), 5352 (duplex).

B. Tamper-Resistant Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

- a. Cooper; TR8300.
- b. Hubbell; HBL8300SG.
- c. Leviton; 8300-SGG.
- d. Pass & Seymour; 63H.

2.3 GFCI RECEPTACLES

A. General Description: Straight blade, non-feed-through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

- a. Cooper; GF20.
- b. Pass & Seymour; 2084.

2.4 TWIST-LOCKING RECEPTACLES

A. Single Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration L5-20R, and UL 498.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

- a. Cooper; L520R.
- b. Hubbell; HBL2310.
- c. Leviton; 2310.
- d. Pass & Seymour; L520-R.

2.5 PENDANT CORD-CONNECTOR DEVICES

- A. Description: Matching, locking-type plug and receptacle body connector; NEMA WD 6 configurations L5-20P and L5-20R, heavy-duty grade.
 - 1. Body: Nylon with screw-open cable-gripping jaws and provision for attaching external cable grip.
 - 2. External Cable Grip: Woven wire-mesh type made of high-strength galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

2.6 CORD AND PLUG SETS

- A. Description: Match voltage and current ratings and number of conductors to requirements of equipment being connected.
 - 1. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and equipment-rating ampacity plus a minimum of 30 percent.
 - 2. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

2.7 SNAP SWITCHES

- A. Comply with NEMA WD 1 and UL 20.
- B. Switches, 120/277 V, 20 A, Toggle Lighted Handle – Illuminated Off, AC quiet Switch, Industrial grade, Self Grounding Clear:
 - 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper; 2221 (single pole), 2222 (two pole), 2223 (three way), 2224 (four way).
 - b. Hubbell; CS1221 (single pole), CS1222 (two pole), CS1223 (three way), CS1224 (four way).
 - c. Leviton; 1221-2 (single pole), 1222-2 (two pole), 1223-2 (three way), 1224-2 (four way).
 - d. Pass & Seymour; 20AC1 (single pole), 20AC2 (two pole), 20AC3 (three way), 20AC4 (four way).
- C. Pilot Light Switches, 20 A:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper; 2221PL for 120 V and 277 V.
 - b. Hubbell; HPL1221PL for 120 V and 277 V.
 - c. Leviton; 1221-PLR for 120 V, 1221-7PLR for 277 V.
 - d. Pass & Seymour; PS20AC1-PLR for 120 V.
 2. Description: Single pole, with neon-lighted handle, illuminated when switch is "ON."
- D. Key-Operated Switches, 120/277 V, 20 A:
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper; 2221L.
 - b. Hubbell; HBL1221L.
 - c. Leviton; 1221-2L.
 - d. Pass & Seymour; PS20AC1-L.
 2. Description: Single pole, with factory-supplied key in lieu of switch handle.
- E. Single-Pole, Double-Throw, Momentary Contact, Center-Off Switches, 120/277 V, 20 A; for use with mechanically held lighting contactors.
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper; 1995.
 - b. Hubbell; HBL1557.
 - c. Leviton; 1257.
 - d. Pass & Seymour; 1251.
 - e. Watt Stopper, DCC2
- F. Key-Operated, Single-Pole, Double-Throw, Momentary Contact, Center-Off Switches, 120/277 V, 20 A; for use with mechanically held lighting contactors, with factory-supplied key in lieu of switch handle.
1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper; 1995L.
 - b. Hubbell; HBL1557L.
 - c. Leviton; 1257L.
 - d. Pass & Seymour; 1251L.

2.8 COMMUNICATIONS OUTLETS

A. Telephone Outlet:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper; 3560-6.
 - b. Leviton; 40649.
2. Description: Single RJ-45 jack for terminating 100-ohm, balanced, four-pair UTP; TIA/EIA-568-B.1; complying with Category 5e. Comply with UL 1863.

B. Combination TV and Telephone Outlet:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cooper; 3562.
 - b. Leviton; 40595.
2. Description: Single RJ-45 jack for 100-ohm, balanced, four-pair UTP; TIA/EIA-568-B.1; complying with Category 5e; and one Type F coaxial cable connector.

2.9 WALL PLATES

A. Single and combination types to match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Brushed Stainless.
3. Material for Unfinished Spaces: Galvanized steel.
4. Material for Damp Locations: Thermoplastic with spring-loaded lift cover, and listed and labeled for use in "wet locations."

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with type 3R weather-resistant with lockable cover.

2.10 FLOOR SERVICE FITTINGS

- A. Type: Modular, flush-type, dual-service units suitable for wiring method used.
- B. Compartments: Barrier separates power from voice and data communication cabling.
- C. Service Plate: Rectangular, solid brass with satin finish.
- D. Power Receptacle: NEMA WD 6 configuration 5-20R, gray finish, unless otherwise indicated.

- E. Voice and Data Communication Outlet: Blank cover with bushed cable opening.
- F. Description: Factory-fabricated and -wired assembly of below-floor junction box with multichanneled, through-floor raceway/firestop unit and detachable matching floor service outlet assembly.
 - 1. Service Outlet Assembly: Flush type with four simplex receptacles and space for four RJ-45 jacks.
 - 2. Size: Selected to fit nominal **3-inch** cored holes in floor and matched to floor thickness.
 - 3. Fire Rating: Unit is listed and labeled for fire rating of floor-ceiling assembly.
 - 4. Closure Plug: Arranged to close unused **3-inch** cored openings and reestablish fire rating of floor.
 - 5. Wiring Raceways and Compartments: For a minimum of four No. 12 AWG conductors and a minimum of **two**, 4-pair, Category 5e voice and data communication cables.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.
- B. Coordination with Other Trades:
 - 1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
 - 2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
 - 3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
 - 4. Install wiring devices after all wall preparation, including painting, is complete.
- C. Conductors:
 - 1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
 - 2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 - 3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
 - 4. Existing Conductors:
 - a. Cut back and pigtail, or replace all damaged conductors.

- b. Straighten conductors that remain and remove corrosion and foreign matter.
- c. Pigtailling existing conductors is permitted provided the outlet box is large enough.

D. Device Installation:

- 1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
- 2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
- 3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
- 4. Connect devices to branch circuits using pigtails that are not less than 6 inches (152 mm) in length.
- 5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
- 6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
- 7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
- 8. Tighten unused terminal screws on the device.
- 9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

- 1. Install ground pin of vertically mounted receptacles up, and on horizontally mounted receptacles to the left.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.

H. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

3.2 IDENTIFICATION

A. Comply with Division 16 Section "Electrical Identification."

1. Receptacles: Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with black-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.

3.3 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
 1. Test Instruments: Use instruments that comply with UL 1436.
 2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.
- B. Tests for Receptacles:
 1. Line Voltage: Acceptable range is 105 to 132 V.
 2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is not acceptable.
 3. Ground Impedance: Values of up to 2 ohms are acceptable.
 4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 5. Using the test plug, verify that the device and its outlet box are securely mounted.
 6. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

END OF SECTION 262726

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 262813

FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. The DDC General Conditions, section 01000, shall apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Cartridge fuses rated 600 V and less for use in switches and panelboards.
 - 2. Spare-fuse cabinets.

1.3 SUBMITTALS

- A. Product Data: Include the following for each fuse type indicated:
 - 1. Dimensions and manufacturer's technical data on features, performance, electrical characteristics, and ratings.
 - 2. Let-through current curves for fuses with current-limiting characteristics.
 - 3. Time-current curves, coordination charts and tables, and related data.
- B. Ambient Temperature Adjustment Information: If ratings of fuses have been adjusted to accommodate ambient temperatures, provide list of fuses with adjusted ratings.
 - 1. For each fuse having adjusted ratings, include location of fuse, original fuse rating, local ambient temperature, and adjusted fuse rating.
 - 2. Provide manufacturer's technical data on which ambient temperature adjustment calculations are based.
- C. Operation and Maintenance Data: For fuses to include in emergency, operation, and maintenance manuals.
 - 1. In addition to items specified in General Conditions, include the following:
 - a. Let-through current curves for fuses with current-limiting characteristics.
 - b. Time-current curves, coordination charts and tables, and related data.
 - c. Ambient temperature adjustment information.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain fuses from a single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100.
- C. Comply with NEMA FU 1.
- D. Comply with NFPA 70.

1.5 PROJECT 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.

1.6 COORDINATION

- A. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Fuses: Quantity equal to 15 percent of each fuse type and size, but no fewer than 3 of each type and size.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Cooper Bussman, Inc.
 - 2. Eagle Electric Mfg. Co., Inc.; Cooper Industries, Inc.
 - 3. Ferraz Shawmut, Inc.

2.2 CARTRIDGE FUSES

- A. Characteristics: NEMA FU 1, nonrenewable cartridge fuse; class and current rating indicated; voltage rating consistent with circuit voltage.

2.3 SPARE-FUSE CABINET

Bronx River Art Center
Bronx, NY

- A. Cabinet: Wall-mounted, 0.05-inch- thick steel unit with full-length, recessed piano-hinged door and key-coded cam lock and pull.
 - 1. Size: Adequate for storage of spare fuses specified with 15 percent spare capacity minimum.
 - 2. Finish: Gray, baked enamel.
 - 3. Identification: "SPARE FUSES" in 1-1/2-inch- high letters on exterior of door.
 - 4. Fuse Pullers: For each size of fuse.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.
- B. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

- A. Service Entrance: Class RK1, fast acting.
- B. Feeders: Class RK1, fast acting
- C. Other Branch Circuits: Class RK1, time delay.

3.3 INSTALLATION

- A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.
- B. Install spare-fuse cabinet.

3.4 IDENTIFICATION

- A. Install labels indicating fuse replacement information on inside door of each fused switch.

END OF SECTION 262813

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 262816

ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.
- B. The DDC General Conditions, section 01000, shall apply to this Section.

1.2 SUMMARY

- A. This Section includes the following individually mounted, enclosed switches and circuit breakers:
 - 1. Fusible switches.
 - 2. Bolted-pressure contact switches.
 - 3. Enclosures.

1.3 DEFINITIONS

- A. GD: General duty.
- B. GFCI: Ground-fault circuit interrupter.
- C. HD: Heavy duty.
- D. SPDT: Single pole, double throw.

1.4 SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
 - 1. Enclosure types and details for types other than NEMA 250, Type 1.
 - 2. Current and voltage ratings.
 - 3. Short-circuit current rating.
 - 4. UL listing for series rating of installed devices.
 - 5. Features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
- B. Shop Drawings: Diagram power, signal, and control wiring.

C. Field quality-control test reports including the following:

1. Test results that comply with requirements.
2. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

D. Manufacturer's field service report.

E. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. In addition to items specified in General Conditions, include the following:

1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.

1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100.
- B. Comply with NFPA 70.
- C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:
 1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
 2. Altitude: Not exceeding 6600 feet.

1.7 COORDINATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with other construction, including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Spares: For the following:

- a. Fuses for Fusible Switches: 3 of each size.
- 2. Spare Indicating Lights: Six of each type installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 FUSIBLE AND NONFUSIBLE SWITCHES

- A. Available Manufacturers:
 - 1. Eaton Corporation; Cutler-Hammer Products.
 - 2. General Electric Co.; Electrical Distribution & Control Division.
 - 3. Siemens Energy & Automation, Inc.
 - 4. Square D/Group Schneider.
- B. Fusible Switch, 600 A and Smaller: NEMA KS 1, Type HD, with clips or bolt pads to accommodate specified fuses, lockable handle with capability to accept two 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; and labeled for copper and aluminum neutral conductors.

2.3 ENCLOSURES

- A. NEMA AB 1 and NEMA KS 1 to meet environmental conditions of installed location.
 - 1. Outdoor Locations: NEMA 250, Type 3R.

PART 3 - EXECUTION

3.1 EXAMINATION

Bronx River Art Center
Bronx, NY

Enclosed Switches And Circuit Breakers
262816 Page 3 of 6

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 CONCRETE BASES

- A. Coordinate size and location of concrete bases. Verify structural requirements with Commissioner.
- B. Concrete base is specified in Division 16 Section "Basic Electrical Materials and Methods," and concrete materials and installation requirements are specified in Division 3.

3.3 INSTALLATION

- A. Comply with applicable portions of NECA 1, NEMA PB 1.1, and NEMA PB 2.1 for installation of enclosed switches and circuit breakers.
- B. Mount individual wall-mounting switches and circuit breakers with tops at uniform height, unless otherwise indicated. Anchor floor-mounting switches to concrete base.
- C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

3.4 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 16 Section "Electrical Identification."
- B. Enclosure Nameplates: Label each enclosure with engraved metal or laminated-plastic nameplate as specified in Division 16 Section "Electrical Identification."

3.5 FIELD QUALITY CONTROL

- A. Prepare for acceptance testing as follows:
 - 1. Inspect mechanical and electrical connections.
 - 2. Verify switch and labeling verification.
 - 3. Verify rating of installed fuses.
 - 4. Inspect proper installation of type, size, quantity, and arrangement of mounting or anchorage devices complying with manufacturer's certification.
- B. Perform the following field tests and inspections and prepare test reports:
 - 1. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Section 7.5 for switches. Certify compliance with test parameters.

12/21/2012

2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

3.6 CLEANING AND ADJUSTING

- A. On completion of installation, vacuum dirt and debris from interiors; do not use compressed air to assist in cleaning. Inspect exposed surfaces and repair damaged finishes.

END OF SECTION 262816

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 265100
INTERIOR LIGHTING -
EMERGENCY LIGHTING & EXITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:

1. Emergency lighting units.
2. Exit signs and Combination Exit Signs & Emergency Lights.
3. Ceiling fans

- B. Related Sections include the following:

1. Division 16 Section "Architectural Lighting" for general lighting fixtures and their controls.

1.3 SUBMITTALS

- A. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:

1. Physical description of lighting fixture including dimensions.
2. Emergency lighting units including battery and charger.
3. Ballast.
4. Energy-efficiency data.
5. Life, output, and energy-efficiency data for lamps.
6. Photometric data, in IESNA format, based on laboratory tests of each lighting fixture type, outfitted with lamps, ballasts, and accessories identical to those indicated for the lighting fixture as applied in this Project.
 - a. For indicated fixtures, photometric data shall be certified by a qualified independent testing agency. Photometric data for remaining fixtures shall be certified by the manufacturer.
 - b. Photometric data shall be certified by a manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program (NVLAP) for Energy Efficient Lighting Products.

- B. Product Certificates: For each type of ballast for bi-level and dimmer-controlled fixtures, signed by product manufacturer.
- C. Qualification Data: For agencies providing photometric data for lighting fixtures.
- D. Field quality-control test reports.
- E. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.
- F. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

1.5 COORDINATION

- A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

1.6 WARRANTY

- A. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period for Emergency Lighting Unit Batteries: 10 years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining nine years.
 - 2. Warranty Period for Emergency Fluorescent Ballast and Self-Powered Exit Sign Batteries: Seven years from date of Substantial Completion. Full warranty shall apply for first year, and prorated warranty for the remaining six years.

1.7 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Lamps: 10 for every 100 of each type and rating installed. Furnish at least one of each type.
 - 2. Plastic Diffusers and Lenses: 1 for every 100 of each type and rating installed. Furnish at least one of each type.
 - 3. Battery and Charger Data: One for each emergency lighting unit.
 - 4. Ballasts: 1 for every 100 of each type and rating installed. Furnish at least one of each type.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
- B. In Interior Lighting Exits and Emergency Lighting Fixture Schedule where titles below are column or row headings that introduce lists, the following requirements apply to product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified:
 - a. Encore Lighting
 - b. LiteAlarm
 - c. SignTex
 - d. Lithonia
- C. Ceiling fans:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified:
 - a. Modern fan (Altus)
 - b. Monte Carlo fans
 - c. Kendall Lighting

2.2 LIGHTING FIXTURES AND COMPONENTS, GENERAL REQUIREMENTS

- A. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.

- B. Incandescent Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5A.
- C. Fluorescent Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5 and NEMA LE 5A as applicable.
- D. HID Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5B.
- E. Metal Parts: Free of burrs and sharp corners and edges.
- F. Sheet Metal Components: Steel, unless otherwise indicated. Form and support to prevent warping and sagging.
- G. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
- H. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:
 - 1. White Surfaces: 85 percent.
 - 2. Specular Surfaces: 83 percent.
 - 3. Diffusing Specular Surfaces: 75 percent.
 - 4. Laminated Silver Metallized Film: 90 percent.
- I. Plastic Diffusers, Covers, and Globes:
 - 1. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
 - a. Lens Thickness: At least 0.125 inch minimum unless different thickness is indicated.
 - b. UV stabilized.
 - 2. Glass: Annealed crystal glass, unless otherwise indicated.

2.3 BALLASTS FOR LINEAR FLUORESCENT LAMPS

- A. Electronic Ballasts: Comply with ANSI C82.11; instant-start type, unless otherwise indicated, and designed for type and quantity of lamps served. Ballasts shall be designed for full light output unless dimmer or bi-level control is indicated.
 - 1. Sound Rating: A.
 - 2. Total Harmonic Distortion Rating: Less than 10 percent.
 - 3. Transient Voltage Protection: IEEE C62.41, Category A or better.
 - 4. Operating Frequency: 20 kHz or higher.
 - 5. Lamp Current Crest Factor: 1.7 or less.

6. BF: 0.85 or higher.
7. Power Factor: 0.95 or higher.

2.4 EXIT SIGNS

- A. Description: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
- B. Internally Lighted Signs:
 1. Lamps for AC Operation: Fluorescent, 2 for each fixture, 20,000 hours of rated lamp life.
 2. Lamps for AC Operation: LEDs, 70,000 hours minimum rated lamp life.
 3. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
 - a. Battery: Sealed, maintenance-free, nickel-cadmium type.
 - b. Charger: Fully automatic, solid-state type with sealed transfer relay.
 - c. Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
 - d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 - f. 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 flashing red LED.

2.5 EMERGENCY LIGHTING UNITS

- A. Description: Self-contained units complying with UL 924.
 1. Battery: Sealed, maintenance-free, lead-acid type.
 2. Charger: Fully automatic, solid-state type with sealed transfer relay.
 3. 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.
 4. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 5. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 6. Wire Guard: Heavy-chrome-plated wire guard protects lamp heads or fixtures.

7. Integral Time-Delay Relay: Holds unit on for fixed interval of 15 minutes when power is restored after an outage.
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 flashing red LED.

2.6 FLUORESCENT LAMPS

- A. Low-Mercury Lamps: Comply with EPA's toxicity characteristic leaching procedure test; shall yield less than 0.2 mg of mercury per liter when tested according to NEMA LL 1.
- B. T8 rapid-start lamps, rated 32 W maximum, nominal length of 48 inches 2800 initial lumens (minimum), CRI 75 (minimum), color temperature 3500 K, and average rated life 20,000 hours, unless otherwise indicated.
- C. Compact Fluorescent Lamps: 4-Pin, CRI 80 (minimum), color temperature 3500 K, average rated life of 10,000 hours at 3 hours operation per start, unless otherwise indicated.
 1. 13 W: T4, double or triple tube, rated 900 initial lumens (minimum).
 2. 18 W: T4, double or triple tube, rated 1200 initial lumens (minimum).
 3. 26 W: T4, double or triple tube, rated 1800 initial lumens (minimum).
 4. 32 W: T4, triple tube, rated 2400 initial lumens (minimum).
 5. 42 W: T4, triple tube, rated 3200 initial lumens (minimum).
 6. 55 W: T4, triple tube, rated 4300 initial lumens (minimum).

2.7 LIGHTING FIXTURE SUPPORT COMPONENTS

- A. Single-Stem Hangers: 1/2-inch steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.
- B. Twin-Stem Hangers: Two, 1/2-inch steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.
- C. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, 12 gage.
- D. Rod Hangers: 3/16-inch minimum diameter, cadmium-plated, threaded steel rod.
- E. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

2.8 REQUIREMENTS FOR CEILING FANS

- A. Fan Type: As indicated on lighting fixture schedule or approved equal.
 1. Modern Fan, Altus, 52" in aluminum finish
 2. Monte Carlo Fan, Studio Ceiling Fan, 54" in aluminum finish

3. Kendall Lighting, 54" in brushed steel finish

2.9 REQUIREMENTS FOR INDIVIDUAL LIGHTING FIXTURES

- A. Fixture Type: As indicated on lighting fixture schedule or approved equal.
- B. 2 Head EM light:
 1. Encore Lighting EB Series Model 12EB-100-2-NY-3P
 2. LiteAlarm 2PG12G1-NY/L9-18
 3. Lithonia ELT1260NY
- C. Combination Exits/Emergency Light:
 1. Encore Lighting LC8 Series Model LC8-2-4X
 2. LiteAlarm Severe Series Combo
- D. Exits:
 1. Signtex Crystal Edge Lit CRR
 2. Enclore Lighting Endurance CX Series
 3. LiteAlarm Simplicity Series
- E. Elevator pit:
 1. Lithonia VW150I M12

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Lighting fixtures: Set level, plumb, and square with ceilings and walls. Install lamps in each fixture.
- B. Support for Lighting Fixtures in or on Grid-Type Suspended Ceilings: Use grid as a support element.
 1. Install a minimum of four ceiling support system rods or wires for each fixture. Locate not more than 6 inches from lighting fixture corners.
 2. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
 3. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two 3/4-inch metal channels spanning and secured to ceiling tees.
 4. Install at least one independent support rod or wire from structure to a tab on lighting fixture. Wire or rod shall have breaking strength of the weight of fixture at a safety factor of 3.
- C. Suspended Lighting Fixture Support:
 1. Pendants and Rods: Where longer than 48 inches brace to limit swinging.

2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.

3.2 FIELD QUALITY CONTROL

- A. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.
- B. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results.

END OF SECTION 265100

SECTION 26 5113
ARCHITECTURAL LUMINAIRES, LAMPS, BALLASTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Contract Drawings, conditions of Contract (including General Conditions, Addendum to the General Conditions, Special Conditions, Division 01 Specification Sections and all other Contract Documents) apply to the work of this Section.
- B. Related Sections: Division 26 is related to this Section.

1.2 SUMMARY

- A. Included in the Work of this Section are labor, materials, and appurtenances required to complete the Work of this Section, as specified herein, as required by job conditions, or as indicated on drawings. The scope of this section includes general requirements for luminaires and their components, coordination, definitions, quality assurances, submittals, mockups, samples and general responsibility for a complete job.

1.3 DEFINITIONS

- A. In this specification, the term "Commissioner" includes the Commissioner, City of New York, Architect, Construction Manager, Owner's representative and/or the Lighting Specifier, together or individually as they shall decide.
- B. The term "luminaires" refers to lighting fixtures with their lamps and all other components.
- C. The use of the word "Approved" shall not extend the Commissioner's responsibilities beyond that as defined in the General Conditions.

1.4 GENERAL REQUIREMENTS

- A. Provide labor, materials, and equipment for the installation of indoor and outdoor luminaires, lighting equipment, control wiring, and lamps as shown on the drawings and specified herein.
- B. Refer to architectural drawings for dimensions and details. Check and verify dimensions and details on drawings before proceeding with the Work. Report any inconsistencies or discrepancies at once to the Commissioner. Should it appear that the Work intended is not sufficiently detailed or explained on the drawings or in the specifications, apply to the Commissioner or for further drawings or explanations, as may be necessary. Conform to these explanations in the work. If any question arises about the true meaning of the drawings or specifications, refer the matter to the Commissioner whose decision is final and conclusive. Under no circumstances shall any request for extra compensation be honored where the basis of claim is such a clarification by the Commissioner. In no case submit a bid, or proceed on any Work with uncertainty. The intention of this specification and the accompanying or applicable drawings is to provide a job complete in every respect. Contractor is responsible for this result.

1.5 COORDINATION

- A. Luminaire locations as indicated on the electrical drawings are generalized and approximate. Carefully verify locations with Architectural drawings, reflected ceiling plans and other reference data prior to installation. Check for adequacy of headroom and non-interference with other equipment, such as ducts, pipes or openings. Bring conflicts to the Commissioner's or attention before proceeding with the Work. Although the location of equipment included in the Work of this Section may be shown on the Contract Drawings in a certain place, actual construction may disclose that the location for the Work does not make its position easily and quickly accessible. In such cases, call the Commissioner's or attention to this situation before installing this Work, and comply with Commissioner's installation instructions.
- B. Clearly indicate the Work to be performed by other trades' contractors, and the materials that are adjacent to or abutting the Work of this Section. Coordinate as required. Give ample notice of special openings required for placing equipment in the building, in order to avoid cutting of completed Work. Furnish the materials and labor for Work included under this Section in ample time, and in sufficient quantities so that all of the Work may be installed in proper sequence to avoid unnecessary cutting of the floors and walls. Schedule the Work to prevent Work of this Section being damaged by other construction operations. Remove and replace Work so damaged at no cost to City of New York. Coordinate and schedule the Work of this Section with the Work of other Sections, Utility Companies and the Telephone Company so that there shall be no delay in the proper installation and completion of any part of each respective Work. Construction Work shall proceed in its natural sequence without unnecessary delay caused by the Work of this Section.
- C. Contractor shall coordinate with other contractors regarding attachment to or openings in the materials of other trades such as pre-cast concrete, ornamental metals, or wood panels for recessed junction boxes, ballast containers, and other equipment.
- D. Contractor shall arrange the installation in proper relation to other Work and with architectural finishes so that it shall harmonize in service and appearance and so that there shall be no interference with the Work of others, including interference in location or level.
- E. Where Work of this Section is to be flush or concealed, install it to assure that it does not project visually or physically beyond the finished lines of floors, ceilings or walls.
- F. Verify ceiling conditions and furnish appropriate mounting details for each luminaire. Such mounting details shall be approved by Commissioner.
- G. Contractor for Work of the Section shall take responsibility to become familiarized with all equipment listed in the luminaire schedule and shall be responsible for the successful completion of the entire lighting installation.
- H. Contractor of the Work of this section shall verify compatibility of supply voltage indicated on electrical drawings with voltage specified for each luminaire prior to release. Bring any and all discrepancies to Commissioner's or attention.

1.6 QUALITY ASSURANCES

- A. Contractor shall comply with the General Requirements above related to Quality Control, in addition to the provisions herein.
- B. Manufacturers: Manufacturers listed in APPENDIX A – LIGHTING FIXTURE DESCRIPTIONS (the fixture schedule) shall be assumed capable of supplying the listed fixtures unless exceptions are set forth

in their quotations. Any such exceptions shall immediately be brought to the attention of the Contractor, the Commissioner and the Lighting Consultant. Acceptable manufacturers are listed in the luminaire schedule. Acceptable manufacturers shall be capable of providing proof of satisfactory production of luminaires of the type and quality shown for a period of at least three (3) years. See Paragraph 2.1.

C. Statement of Application:

1. By commencing the Work of this Section, the Contractor assumes overall responsibility, as a part of the warranty of the Work, to assure that assemblies, components and parts shown or required within the Work of this Section, comply with the Contract Documents.
2. Warranty: In addition to any warranties required by the General Requirements, the Contractor of the Work of this section shall:
 - a. For a period of one year after City of New York's initial acceptance and establishment of the beginning date of the warranty period, and at no additional cost, Contractor shall promptly provide and install replacements for luminaires or components thereof which in the opinion of the Commissioner are defective in materials or workmanship under normal operating conditions, except for lamps; or Contractor shall repair installed equipment at the job site to Commissioner's satisfaction. For any time during the warranty period that luminaires are not fully functional due to defects in materials or workmanship, Contractor shall provide or pay for and install and remove suitable and adequate temporary luminaires. Contractor also warrants replacement luminaires or components to be free of defects in workmanship or materials for a period of one year following replacement, and shall replace any defective replacements.
 - b. Contractor shall not be held responsible for acts of vandalism or for abnormal or accidental abuse of the luminaires or their components occurring after the beginning of the warranty period, nor shall Contractor be held responsible for deleterious effects caused by maintenance procedures performed without the concurrence of Contractor.

D. Equipment Compatibility:

Provide similar luminaires, ballasts and other components fabricated by one manufacturer, to simplify maintenance and replacement of equipment. Under no circumstances shall lamps of the same type, even if different wattages, be supplied by more than one manufacturer.

E. Regulatory Agencies:

1. Provide luminaires constructed, wired and installed in compliance with the current edition of applicable city, state and national codes. Provide luminaires conforming to or exceeding Underwriters Laboratories (UL) standards, and to provisions of applicable codes which exceed those standards.
2. For any category of luminaire tested by any of the following agencies, provide luminaires listed and labeled by an independent Nationally Recognized Testing Laboratory (NRTL) such as UL, ETL, CSA, MET
3. In addition, provide luminaires which conform to additional regulations necessary to obtain approval for use of specified luminaires in locations shown. Use only electrical components listed by the above agencies.

F. Recognized Standards: In addition to standards that may be referenced the General Conditions, luminaires shall comply with the applicable standards of the following organizations.

1. Underwriters Laboratories (UL).
2. National Electrical Code (NEC).
3. Certified Ballast Manufacturers Association (CBM).
4. Illuminating Engineering Society of North America (IESNA).
5. American Society for Testing and Materials (ASTM).
6. American National Standards Institute (ANSI).
7. National Electrical Manufacturers Association (NEMA)

1.7 SUBSTITUTIONS:

- A. Luminaires included under this Section are specified by approved manufacturer and type. Furnish equipment as specified, unless substitutions are mutually agreed upon, as follows:

1. This project must comply with LEED 2.2 New Construction criteria for lighting power density (lpd). Any proposed substitutions must be accompanied by full point-by-point calculations and auxiliary technical documentation demonstrating that the proposed luminaires fully meet the criteria.
2. Substitutions are subject to a physical mockup at the request of the Commissioner. See paragraph 1.10 below.
3. Substitutions shall be indicated as such in the bid documents, and operable samples, catalogue cuts and complete photometric reports by independent testing laboratories submitted. A complete comparison of the performance of the proposed substitution in relation to the performance of at least the first named specified product shall be included. In addition, for any fixture type of which six (6) or more of the luminaires are to be used, Contractor shall submit computer generated point-by-point calculations for illumination and exitance of the ceiling plane on auto-cad backgrounds provided by the architect for such purpose. Such backgrounds may include either the typical mounting condition for the subject fixture or a specialized mounting condition deemed by the architect or lighting consultant to be critical for the success of the design. Calculations shall also include horizontal illumination calculations for the entire space, on a standard reference plane of 2'-6" (760 mm) AFF. Computer printouts for standard industrial fluorescent channels are exempt from this requirement.
4. Written documentation shall clearly show that the proposed manufacturer complies with each and every aspect of the specification and/or indicate any exceptions or variations. Where proposed substitutions alter the functional or visual design, or change the space requirements or mounting details indicated herein or on the drawings, such changes shall be detailed in the proposal and costs indicated for revised design and construction for trades involved. Cost data shall be provided as called for in the General Requirements. Submittal shall include names and addresses of similar projects on which the product was used, including names and phone numbers of specifiers and Owners of each project, and dates of installation.

- B. Value Engineering:

To the extent that Value Engineering is allowed in the General Requirements, the procedure for value engineering is the same as outlined above regarding the substitution process, with the words "value engineering proposed substitution(s)" replacing the word "substitution(s)". Value engineering submittals shall be clearly separated from substitutions, and line item cost savings for each proposed fixture type clearly documented.

1.8 SUBMITTALS

A. General:

1. For standard catalog items with no modifications, submit catalog cut sheets prepared by the manufacturer which clearly show all elements to be supplied and all corresponding product data (including lamping; ballast manufacturer and model number; voltage; accessories or options and any miscellaneous items detailed in the written description of the specification.) If cut sheet shows more than one (1) fixture type, all non-applicable information shall be crossed out.
2. For custom fixtures, modified fixtures or linear fluorescent or LED fixtures mounted in continuous rows, submit a layout drawing prepared by the manufacturer showing all details of construction, lengths of runs, lamping layout, pendant locations, power locations, finishes and list of materials. Drawings must be to scale. Contractor shall provide manufacturer with field dimensions where required. If scallop shields, wallwash reflectors or baffles are required, drawings shall indicate relative position to wall or adjacent vertical surface.
2. Manufacturer shall provide submittals with fixture installation instruction sheets.

B. Submittal Schedule (Note: All days, week or months listed are "**calendar**" days, weeks or months, and not working days, weeks or months):

1. List of Intended Manufacturers: Within fifteen (15) calendar days of the Commissioner's Notice to Proceed, Contractor shall submit to the Commissioner a List of Intended Manufacturers, with estimated fabrication lead times. "Lead times" shall be measured in weeks, beginning from the manufacturer's receipt of approved shop drawings and release, and ending at shipment. Commissioner shall indicate if any manufacturers are unacceptable.
2. Acknowledgments and standard shop drawings: Within twenty (20) days after receipt of the Commissioner's response to the list of Intended Manufacturers, Contractor shall submit to the Commissioner copies of purchase orders and manufacturers' acknowledgments for all luminaires specified, conforming to Commissioner's responses. The purchase orders and the manufacturer's acknowledgments need not list prices, but shall contain a guaranteed fabrication lead time, in weeks, as defined above. These fabrication times shall be adequate for the timely completion of the job. At the same time, but not less than twenty four (24) weeks before standard manufactured luminaires are required on the site, Contractor shall submit to Commissioner shop drawings for all standard luminaires or those with minor modifications.
3. Release for fabrication: Within twenty (20) days after receipt of shop drawings marked "No Exceptions Taken" or "Make Corrections Noted", Contractor shall release luminaires for fabrication and forward to the Commissioner verification that the luminaires have been released for fabrication, a guaranteed shipment date for each specified luminaire, as well as forward finish or component samples, tests, or any outstanding data required for approval.
4. Operable luminaire samples and mockups as indicated in APPENDIX A - LIGHTING FIXTURE DESCRIPTIONS (the fixture schedule) shall be received by the Commissioner or designated parties, or installed on the site, within forty five (45) days after Contractor's receipt of shop drawings marked "No Exceptions Taken" or "Make Corrections Noted".
5. Re-submissions: Within fourteen (14) days after Contractor's receipt of shop drawings marked "Revise and Resubmit" or "Rejected", Contractor shall resubmit revised shop drawings to the Commissioner in accordance with the General Requirements regarding re-submissions.
6. Contractor shall notify the Commissioner of any potential scheduling problems, or of any submittals that have not been returned to the Contractor which are required to maintain the installation

schedule. Such notification shall be in a timely manner and well in advance of the time such delay might affect the fabrication schedule or appropriate delivery of luminaires.

7. Request for Final Layout: At the same time that shop drawings are submitted, the Contractor shall request verification of final layouts and control zones for all luminaires. Contractor shall also submit templates for labeling of all controls. Layout adjustments shall be considered no-cost clarification as long as the quantity or value of luminaires does not increase. Labeling templates shall be returned by the Commissioner within thirty (30) calendar days. If control template information is not available from the Commissioner, the contractor shall furnish blank control station faceplates. The Commissioner shall coordinate the faceplate labeling information with the tenants and shall provide the same to the contractor. Custom engraved (or labeled) faceplates shall be requested from the manufacturer so that they arrive prior to the final release of the space to the Commissioner and subsequent beginning of the warranty period. Blank faceplates shall be replaced with custom labeled faceplates at no additional cost.

C. Shop Drawings:

1. Submit shop drawings for each type of luminaire, arranged in order of lighting type designation except where specified luminaires are standard, unmodified, "off-the-shelf" units, fully described by catalogue cuts. If allowed by Commissioner, such catalogue cuts may be substituted for shop drawings. Submit catalogue cuts of lamps to be provided for each luminaire. Submit shop drawings in the quantity and format called for in the General Requirements.
2. Shop drawings shall show all luminaire components, including but not limited to lampholders, reflectors, louvers, lenses, fuses, junction boxes, ballasts and lamps. Shop drawings shall show materials, finishes, metal gauges, overall and detailed dimensions, sizes, electrical and mechanical connections, fasteners, welds, joints, any exposed hardware, and conditions, or provisions for the work of others, and similar information. Indicate complete details of the luminaire, including manufacturer's name and catalogue numbers for sockets, ballasts, light shields, switches and type of wiring, and targeting and locking devices for adjustable luminaires. Indicate that lamp type specified is acceptable for luminaire design. Indicate type and extent of approved inert insulating materials to prevent electrolytic corrosion at junctions of dissimilar metals. Include pertinent mounting details including hung ceiling construction. Standard catalogue cuts shall be supplemented by additional drawings if information or descriptions listed above are not included in the cuts. Photometric documentation and finish samples shall be provided upon request. Samples shall be provided if indicated in APPENDIX A - LIGHTING FIXTURE DESCRIPTIONS (the luminaire schedule). No luminaires will be approved without the previous described submission of data. Submissions may be modified by the Commissioner before approval. Luminaires or other materials shall not be fabricated, shipped, stored or installed unless prior written approval from the Commissioner has been received.
3. Submit lamp layouts for continuous luminaires or coves, indicating overall field measurements and proposed lamp lengths, and condition of joints, corners, and ends.
4. Submit catalogue cuts for all lamps, ballasts and emergency battery backup ballasts..

- D. Data: Submit independent laboratory photometric data in the directed number of copies and in format as directed by Commissioner. Photometric data shall be submitted for standard, "off-the-shelf" units at the time the manufacturer's cuts are submitted. Photometric testing and reporting shall conform to IESNA procedures.

- E. Manufacturer's Catalogue Sheets shall indicate input watts and electrical characteristics, ambient temperature rating, noise level rating, mounting methods and UL or ETL listing for use with required lamp and ballast (if any).

1.9 SAMPLES

- A. After shop drawings, data and any other required submissions have been approved, submit to Commissioner samples of each of the following components:
 - 1. Samples demonstrating the finishes of any custom metal, paint color or finish requested by Commissioner. Sample size to be a minimum of four inches (100mm) square. Place labels on the back side of finish samples only.
 - 2. Material samples of any transmitting media, such as plastic, glass, perforated metal and the like. Sample size to be a minimum of twelve (12) inches square, to allow adequate space for label.
 - 3. Each incandescent, compact fluorescent or H.I.D. downlight reflector cone that differs in size or finish, if requested during shop drawing review.
 - 4. Any other luminaires or components requested in the luminaire descriptions or schedule.
- B. If luminaire samples are requested, submit two (2) samples unless otherwise indicated. Supply completely operable luminaires with the specified lamp and a 10'-0" (3m) cord and plug for standard 120 volt service. For 277 volt luminaires, also supply a completely wired or plug-wired step-up transformer to convert from 120 to 277 volts, with a 120 volt cord and plug. Provide component parts as specifically requested.
- C. Where a sample is submitted or requested, do not fabricate that luminaire type until the sample is approved. Submit and resubmit a sample as required, until samples are approved.
- D. Submit complete and operable sample luminaires for any proposed substitution or value engineering proposal as indicated above. Acceptance of substitution samples received after substitution period shall not be binding on the Commissioner.
- E. Provide samples as called for in the General Requirements. Tag samples with the name of the project, referenced specification, paragraph or drawing number, the luminaire type number and any other identifying data. Ship the samples to two separate addresses as specified by Commissioner. After review, the samples shall be shipped to the Commissioner at the project site for use as standards. All transportation charges for samples shall be paid by Contractor. Make luminaires supplied under the Work of this Section identical with approved samples. Do not install any sample luminaires in the project.
- F. If sample submissions are not approved, samples shall be returned to Contractor, at Contractor's expense. Upon receipt of sample disapproval, immediately make a new submission of samples meeting the contract requirements, as called for in the General Requirements.

1.10 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Luminaires and their component elements shall be delivered to the job site factory-assembled and wired to the greatest extent practical, in strict accordance with the approved shop drawings, samples, certificates and catalogue cuts, and shall be handled in a careful manner to avoid damage.

- B. Exposed finishes shall be protected during manufacture, transport, storage and handling. Delivered materials shall be identical to the approved samples. Materials which become damaged shall be repaired and/or replaced as directed.
- C. Luminaires shall be stored under cover, above the ground, in clean, dry areas, and shall be tagged and/or marked as to type and location.
- D. Delivered luminaires shall include wiring, sockets, ballasts, shielding, channels, lenses and other parts and appurtenances necessary for luminaire installation of each luminaire type.
- E. Protect luminaires that are to be integrated into, or finally located after completion of construction work.

1.11 MOCK-UP

As a part of the Work of this Section, when specifically called for in the Luminaire Schedule, and at no additional cost to The City of New York, temporarily install, connect and adjust a reasonable number of luminaires, three (3) unless otherwise stated. Install completely operable luminaires with all lamps, ballasts, etc., of each type listed in the Luminaire Schedule where a mock-up is specified, to verify specified requirements. Place the mock-up luminaires where and when directed by Commissioner. Remove and store mock-up luminaires, when approved, as necessary to complete the work, at Contractor's expense.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide materials, equipment, appurtenances and workmanship for the Work of this Section conforming to the highest commercial standards, as specified and indicated on the drawings. Make luminaire parts and components not specifically identified or indicated on the drawings, of materials most appropriate to their use or function, and resistant to corrosion and to thermal and mechanical stresses encountered in the normal application and function of the luminaires.
- B. Provide recessed luminaires that are constructed to be suitable for and compatible with the ceiling, wall, pavement or other materials and construction in which they will be installed.
- C. Named manufacturers, when listed in the luminaire schedule, are representative of an adequate level of quality and reputation, and are allowed to submit a product, provided that they are capable of satisfying the provisions of the specifications in every respect. This does not mean that any standard product provided by that manufacturer is automatically qualified. Manufacturers not on this list may be proposed during the substitution period if they can provide substantiation that their product meets every particular of the relevant specification, and are of comparable quality, experience and reputation. See the paragraph titled "Substitutions", above. The Commissioner may reject any product.

2.2 MARKING OF LUMINAIRES

Plainly mark luminaires equipped with ballasts for operation of specific lamps, (e.g., "Use Rapid Start Lamps Only" or "Use T8 Lamps Only"). Similarly, mark other luminaires according to proper lamp type. Clearly mark ballasts that have multi-level outputs as such, and indicate proper terminals for the various outputs. Provide markings that are clear and that are located to be readily visible to service personnel, but invisible from normal viewing angles when lamps are in place.

2.3 MATERIALS AND FABRICATION

- A. Provide luminaires completely factory-assembled and wired and equipped with necessary sockets, ballasts, wiring, shielding, reflectors, channels, lenses, and other parts and appurtenances necessary. Deliver to project site ready for installation and to complete the luminaire installation.
- B. Use only completely concealed hardware, unless otherwise noted. Latching of luminaire door frames shall be unobtrusive. Make luminaire free from light leaks by the inherent design of the luminaire body and frame. Bond gaskets, when used, to the luminaire metal. Gasket incandescent luminaires with overlapping trim. Weld ballast support studs, socket saddle studs and reflector support studs to luminaire body. Make flexible leads enter luminaires at sides, unless otherwise noted.
- C. Minimum gauges sheet steel: 20 gauge NYC for recessed fluorescent, unless thicker gauge required by regulating agency; 18 gauge for incandescent, unless otherwise specified.
- D. Construct luminaires with the minimum number of joints. Make unexposed joints by approved method such as welding, brazing, screwing or bolting. Soldered joints are not acceptable.
- E. Provide metallic cast or extruded parts of luminaires that are close grained, sound, and free from imperfections or discoloration. Provide cast or extruded parts that are rigid, true to pattern, and of ample weight and thickness. Provide cast or extruded parts that are properly fitted, filed, ground, and buffed to provide finished surfaces and joints free of imperfections. Make thickness on cast parts not less than 1/8 inch (3mm).
- F. Provide housings that make electrical components easily accessible and replaceable, without removing the luminaire body from its mounting, for luminaires employing discharge lamps (fluorescent, H.I.D.).
- G. Provide luminaires indicated as "continuous" on drawings or specifications with finished end-to-end or wall-to-wall appearance. Utilize fluorescent lamps of 36" and 48" lengths only, unless otherwise specified. Do not overlap single rows of lamps, unless otherwise specified. Maximize lighted length to nearest whole foot, with equally spaced unlighted portions at each end, not to exceed 6" each. Provide continuous louvers and/or lenses into unlighted ends and at corners.
- H. Wiring:
 - 1. Provide luminaire wiring between lampholders and associated operating and starting equipment in compliance with UL 1570 and NEC.
 - 2. Make connections of wires to terminals of lampholders and other accessories in a neat and workman-like manner and which are electrically and mechanically secure, with no loose strands protruding. Provide a number of wires extending to or from the terminals of a lampholder or other accessory that does not exceed the number which the accessory is designed to accommodate.
 - 3. Provide wiring channels and wireways free from projections and rough or sharp edges throughout. At points or edges over which conductors shall pass and may be subject to injury or wear, grind to make a smooth contact surface with the conductors. Install insulated bushings at points of entrances and exit of flexible wiring.

2.4 FINISHES

- A. Apply luminaire finishes after fabrication in a manner that assures a durable wear-resistant surfacing. Prior to finishing, hot clean the surfaces by accepted chemical means, and treat them with corrosion inhibiting (phosphating) treatment to assure positive paint-adhesion. Give exposed metal surfaces (brass, bronze, aluminum and others) and finished castings except chromium-plated or stainless steel parts an even coat of high grade methacrylate lacquer, or transparent epoxy. Anodize exposed aluminum surfaces for corrosion resistance. Make sheet steel luminaire housing, and iron and steel parts which have not received phosphating treatment, or which are to be utilized in exterior applications corrosion resistant by zinc or cadmium plating or hot-dip zinc galvanizing after completion of all forming, welding, or drilling operations.
- B. Electroplate parts operated under temperatures injurious to hot-dipped galvanizing.
- C. Cadmium plate screws, bolts, nuts and other fastening or latching hardware.
- D. Except where otherwise indicated provide luminaires with a final synthetic, high-temperature baked enamel coating of color and finish as specified or directed. Unless otherwise specified, provide white baked enamel "reflective" surfaces, with a minimum reflectance of 86%. Unless otherwise specified, provide potentially visible non-reflective surfaces with a matte-black baked enamel finish. Prior to painting give all parts proper etched surface preparation to assure paint adherence and durability.

2.5 BALLASTS

- A. General:
 - 1. Provide identical ballasts within each luminaire type. Provide ballasts that are suitable for and UL-listed for the electrical characteristics of the supply circuits to which they are to be connected, and which are suitable for operating the specified lamps.
 - 2. Unless otherwise specified, provide ballasts of same type and same manufacturer, for ease of stocking and replacement. Use multiple lamp ballasts to the greatest extent possible.
 - 3. Rigidly mount ballasts, unless specifically indicated to the contrary, to the luminaire housing, with ballast surfaces and housing in complete contact for efficient conduction of ballast heat. Permanently affix ballast mounting screws to the luminaire housing.
 - 4. Ballast shall not contain polychlorinated biphenyls (PCBs), and shall be labeled "No PCBs".
 - 5. Provide only luminaires whose design, fabrication, and assembly prevent overheating or cycling of lamps and ballasts under any condition of use.
 - 6. Ballast shall start lamps at a minimum starting temperature of 50° F (10° C). For luminaires located where ambient temperature may fall below 50° F (10° C), provide low temperature ballasts having a minimum starting temperature of "minus 20° F" ("minus 25° C"), unless a different temperature is called for elsewhere in these specifications.
 - 7. Provide ballasts having the quietest sound-rating available for the lamps specified and clearly showing their respective sound ratings. Replace ballasts found by Commissioner or Engineer to be unduly noisy, without charge, prior to acceptance of the job. Inform Commissioner in writing if ballasts with a sound rating other than "A" are to be provided.

8. Provide ballast of the highest available power factor type.
9. Electronic ballasts shall meet the requirements of the Federal Communications Commission Rules and Regulations, Part 18, Part C (RF Lighting Devices) Non-consumer equipment, regarding radio frequency interference (RFI) (radiated) and electromagnetic interference (EMI) (power line conducted).
10. Submit ballast details with luminaire shop drawings.

B. Fluorescent Ballasts (General):

1. Provide energy efficient fluorescent ballasts conforming where relevant to UL 935 "Fluorescent Lamp Ballasts," ANSI C82.11 "Ballasts for Fluorescent Lamps - Specification," ANSI C82.2 "Methods of Measurement of Fluorescent Lamp Ballasts," ANSI NFPA/70, and Public Law 100-357 National Appliance Energy Conservation Amendment of 1988 and be CSA certified where applicable.
2. Provide electronic solid-state high frequency (20 kHz or greater) fluorescent ballasts, unless otherwise specified.
3. Ballast shall be a NEMA Premium electronic ballast (do not substitute).
4. Ballasts shall be designed to operate on the voltage system to which they are connected, and designated by the ballast manufacturer as suitable and UL listed for operating the specified lamps.
5. Ballasts shall operate from 50 or 60 Hz input source of 120, 277, or Universal (120-277) Volts, and sustained variations of $\pm 10\%$ (Voltage & Frequency) with no damage to the ballasts.
6. Total line current harmonic distortion (THD) shall not exceed 20%.
7. Ballast shall be of high power factor type, with a Power Factor of 0.90 or greater.
8. Lamp current crest factor (ratio of peak to RMS current) shall not exceed 1.7 for full output lamps, in accordance with ANSI C 82.11.
9. Ballast shall be Class P thermally protected and for use indoors or in type I outdoor application.
10. Ballasts shall tolerate operation in ambient temperatures up to 105° F (40° C) without damage.
11. Ballast shall have an "A" sound rating for all interior applications.
12. Ballast shall withstand line transients as defined in ANSI/C62.41-1991, Location Category A2.
13. Ballasts shall have a warranty of five (5) years and a replacement allowance of \$10 each unless otherwise noted.
14. Manufacturer shall have been manufacturing electronic ballasts for at least three (3) years.
15. T8 lamps shall only be operated on ballasts designed for operation of T8 lamps.
16. Unless otherwise specified, T8 ballasts shall have a light output (ballast factor) of 0.85-0.90 (± 0.025) when tested with a compatible full-wattage lamp.

17. Ballast shall regulate light output properly within a range of $\pm 10\%$ of center voltage (i.e., 120 V or 277 V).
18. Ballast shall have a frequency of operation of 20 KHz or greater, and incorporate adequate 60 Hz filtering in order to operate with less than 5% flicker (maximum 0.20 Flicker Index) with any triphosphor lamp suitable for the ballast. The 60 Hz envelope shall not exceed 0.6 of the peak light output.
19. Ballasts shall be compatible with specified occupancy sensors and all other lighting control systems.
20. Ballast shall operate lamps in parallel, allowing remaining lamp(s) to maintain full light output if one or more lamps fail.
21. Instant Start Electronic Solid State Fluorescent Ballasts: Supply instant-start electronic solid-state fluorescent ballasts unless specified otherwise. Instant start ballast shall not reduce rated lamp life by more than 25% compared with rapid start operation, when operating lamps 3 hours per start. Efficiency: Lamp-ballast mean efficacy for 4-foot T-8 high performance HPX lamps (defined elsewhere) shall meet or exceed 109 mean lumens/input watts for one, two or three-lamp ballasts.
22. Program Rapid-Start Electronic Solid-State Fluorescent Ballasts: Provide programmed rapid start electronic solid-state fluorescent ballasts when specifically called for. Cathode voltage for program rapid start lamps during starting shall be between 3.4 and 4.5 volts across a dummy load and between 2.5 and 5.0 volts during operation per ANSI C.82. Lamp-ballast mean efficacy for 4-foot T-8 high performance HPX lamps (defined elsewhere) shall meet or exceed 107 mean lumens/input watts for one, two or three-lamp ballasts.

C. Dimmable Electronic Fluorescent Ballasts:

If dimming ballasts are called for in the Specifications, provide NEMA Premium electronic solid state dimming ballasts which meet or exceed the requirements of Paragraphs A and B above, including the requirements for Programmed Rapid Start Electronic Solid State Fluorescent Ballasts. Dimming ballasts shall also meet or exceed the following criteria:

1. Unless otherwise specified, ballast shall dim smoothly and continuously from 100% to 3% for T8 and Compact Fluorescent Lamps and 100% to 1% of full light output for T5 lamps. Lamps shall not visibly flicker at lowest setting.
2. Light output (ballast factor) shall be not less than 0.88 at 100% output setting, tested with a 32 watt T8 lamp.
3. The absolute magnitude of the THD, as measured at full output, shall not exceed 20% throughout the dimming range.
4. Lamp current crest factor shall not exceed 1.7 throughout the dimming range.
5. Ballast shall maintain full lamp filament heat when lamp is dimmed.
6. Dimming ballast shall be able to operate at full light output, in case of failure of control system or when ballast is not connected to an external control system.

7. Ballast shall be compatible with the lighting control system, and certified as such by Contractor and Manufacturer.
8. Acceptable Manufacturers: Lutron "Hi-Lume" Lutron "Eco-10", Universal "Address Pro"

D. Compact Fluorescent Ballasts:

1. General:

In addition to the relevant requirements of Paragraphs A and B above, compact fluorescent ballasts shall meet or exceed the following criteria:

- a. The term "related hardware," as used in this specification section, refers to starters, thermal protection devices, and power-factor correction devices, as applicable.
 - b. Ballast and related hardware shall operate the specified lamps in accordance with ANSI C82.1 and C78, as applicable, and in accordance with the specified lamp manufacturer's recommendations where no ANSI standards exist.
 - c. Ballasts and related hardware shall have a warranty of two (2) years.
 - d. Installation shall conform to applicable manufacturers' recommendations for enclosed or open operation of both lamps and ballasts, as applicable.
 - e. Installation shall follow manufacturer's instructions regarding input current for each ballast when calculating or evaluating circuit loading.
 - f. Ballasts and related hardware shall withstand line transients as defined in IEEE publication 587, Category A.
 - g. For luminaires located where ambient temperature may fall below 50° Fahrenheit (10° Celsius), provide low temperature ballasts, lamps, and related hardware having a minimum starting temperature of 0° Fahrenheit ("minus 15° Celsius"), unless a different temperature is called for elsewhere in these specifications.
 - h. Outdoor applications shall employ Type I Outdoor rated ballasts only.
2. Electronic Solid State Rapid Start Ballasts, for use as specified with compact fluorescent lamps without integral starters:

Provide electronic solid state rapid start ballasts unless otherwise called for, or unavailable for the specific wattage or luminaire. Provide ballasts that meet or exceed the relevant requirements of Paragraphs A and B, above, and the general requirements for compact fluorescent ballasts. Ballasts shall also meet or exceed the following criteria:

- a. Ballast shall be specifically designed to operate the lamps specified.
- b. Ballasts shall have a frequency of operation of 20 KHz or greater and incorporate adequate 60 Hz filtering in order to operate with less than 5% flicker (maximum 0.20 Flicker index) with any triphosphor lamp suitable for the ballasts.
- c. Ballasts shall be of high power factor type, with a Power Factor of 0.90 or greater.

- d. Total line current harmonic distortion (THD) shall not exceed 20%.
 - e. Light output (ballast factor) shall be no less than 0.85 when tested with the specified lamp.
 - f. Acceptable Manufacturers: Energy Savings, ETTA, Robertson, Hatch, Lightolier, Advance.
3. Electronic Dimming Ballasts, for use as specified with compact fluorescent lamps without integral starters:

If compact fluorescent dimming ballasts are called for in the Specifications, provide dimming ballasts that meet or exceed the relevant requirements of Paragraphs A, B, and C above, as well as the requirements for electronic rapid start compact fluorescent ballasts, above. Ballasts shall also meet or exceed the following criteria:

- a. Ballast shall be of high frequency solid state type for adjustable light output control of specified fluorescent lamps.
 - b. Unless otherwise specified, ballast shall dim smoothly and continuously from 100% to 5% of full light output. Lamps shall not visibly flicker at lowest setting.
 - c. Light output (ballast factor) shall be not less than 0.85 at 100% output setting, tested with the specified lamp.
 - d. The absolute magnitude of the THD, as measured at full output, shall not exceed 20% throughout the dimming range.
 - e. Lamp current crest factor shall not exceed 1.7 throughout the dimming range.
 - f. Ballast shall maintain full lamp filament heat when lamp is dimmed.
 - g. Dimming ballast shall be able to operate at full light output, in case of failure of control system or when ballast is not connected to an external control system.
 - h. Ballast shall be compatible with the lighting control system, and certified as such by Contractor and manufacturer.
 - i. Acceptable Manufacturers: Lutron
2. Preheat Electromagnetic Ballasts for use with Compact Fluorescent Lamps:

In addition to the requirements of Paragraph A, above, and the general requirements for compact fluorescent ballasts, electromagnetic preheat compact fluorescent ballasts shall meet or exceed the following criteria:

- a. Ballast shall be specifically designed to operate the specified lamps.
- b. Ballast shall be combined with lamp manufacturer's recommended starter (ignitor).
- c. Ballast shall be of high power factor type or power factor corrected, with an effective Power Factor of 0.80 or greater.

d. Acceptable Manufacturers: Universal, Advance, Keystone

E. Fluorescent Emergency Ballasts:

If fluorescent emergency ballasts are called for in the Specifications, provide emergency ballasts which meet or exceed the requirements of Paragraphs A and B above. Ballasts shall also meet or exceed the following criteria:

1. The emergency ballast shall include a high-temperature, maintenance-free nickel-cadmium battery, charger and electronic circuitry.
2. Emergency ballast shall be compatible with 1, 2, 3, or 4-lamp electronic, standard, energy saving, and dimming linear fluorescent AC ballasts. The emergency ballast shall also be compatible with twin (TT), quad (DTT), and triple tube (TTT) compact fluorescent lamps.
3. The emergency ballast shall not interfere with normal operation of luminaire.
4. A solid-state charging indicator light to monitor the charger and battery, a double-pole test switch, and installation hardware shall be provided.
5. The emergency ballast shall be capable of operating (1 or 2) fluorescent lamp(s) at the rated lumen output in the emergency mode for a minimum of 90 minutes.
6. The emergency ballast must be fed from the same branch circuit as the AC ballast.
7. The emergency ballast shall be UL listed for installation inside, on top of, or remote (half of the distance of the recommended distance of the standard ballast) from the fixture.
8. The emergency ballast shall be suitable for wet, damp, or hazardous location luminaires.
9. The emergency ballast shall have a warranty of (5) years from date of purchase.

F. HID Ballasts:

In addition to the requirements of Paragraph A above, HID electromagnetic ballasts shall meet or exceed the following criteria:

1. General:

Contractor shall provide HID ballasts with appropriate capacitors and starter, referred to herein as the ballast assembly, that meet or exceed the following criteria:

- a. Use pulse-rated lamps and ballasts whenever available for the specific lamp wattage.
- b. Provide HID ballast assemblies conforming to all relevant UL, ANSI, and ANSI/NFPA listings, standards, and codes. Ballasts shall be UL 1029 and 1572 listed and meet ANSI C82.4.
- c. Insulation shall be Class H (180° C) or higher insulation system and vacuum impregnated with a 100% solid based resin.
- d. Core and coil components shall be potted, unless otherwise specified. All coils shall be precision wound.
- e. Core & Coil ballasts shall be designed to operate at least 180 cycles of 12 hours on and 12 hours off, with the lamp circuit in an open or short-circuited condition and without undue reduction in ballast life.
- f. In locations where ambient temperatures may fall below 50° F (10° C), ballast assemblies shall start lamps at a minimum temperature of minus 22° F (minus 30° C).
- g. Ballast shall have a warranty of two (2) years, and a replacement labor allowance of \$10.

- h. Ballast assemblies shall be capable of starting and operating specified lamps within a range of $\pm 10\%$ of the specified circuit voltage.
- i. Ballast shall be of high power factor or power factor corrected type, with a power factor of 0.90 or greater.
- j. Lamp current crest factor shall not exceed 1.8.
- k. Ballast shall have highest sound rating available, but no lower than "B" for all interior applications, unless otherwise noted.
- l. The light output shall not vary more than $11\% \pm 5\%$ voltage variation in high reactance circuit and not more than 5% with a $\pm 10\%$ voltage variation in CWA circuit.
- m. Lamp drop out voltage shall not exceed minus 25% of the rated voltage for the high reactance circuit and minus 30% for the CWA circuit.
- n. Ballast assemblies shall withstand line transients as defined in ANSI/C62.41
- o. Acceptable Manufacturers: Universal, Valmont, Advance.

2. Electronic HID Ballasts:

Contractor shall provide electronic HID ballasts with appropriate capacitors and starter, referred to herein as the ballast assembly, that meet or exceed the following criteria:

- a. Total Line Current Harmonic Distortion (THD) shall not exceed 30%.
- b. Ballast shall be thermally protected.

3. Electronic Metal Halide Ballasts:

In addition to the requirements of Paragraph A, and the requirements for HID ballasts above, electronic metal halide ballasts shall meet or exceed the following criteria:

- a. Lamp current crest factor shall not exceed 1.5.
- b. Unless otherwise specified, ballast shall maintain constant light output ($\pm 3\%$) within operating ranges of $\pm 10\%$ of center voltage (i.e., 120 V or 277 V).
- c. Ballast shall have sound rating "A".
- d. When operating 39 Watt Metal Halide lamps, ballast shall contain an automatic shutoff circuit or be otherwise protected to prevent damage of the ballast in the event of a lamp failure. 39W WPI ballasts shall be manufactured after February 1, 1996.
- e. Acceptable Manufacturers: Osram/Sylvania, WPI.

2.7 LAMP HOLDERS

- A. Provide incandescent and H.I.D. lamp sockets with porcelain housings over copper screw shells, with medium base sockets rated at 660W. Plastic or metal sheet sockets are not approved.
- B. Provide fluorescent luminaire sockets that are white, constructed of heat resistant plastic. Fluorescent lamp sockets operating with an open circuit voltage in excess of 300 volts shall be of the safety type which open the supply circuit when the lamp is removed from the sockets. Lampholders shall comply with UL 542 and ANSI C81.
- C. Only "knife edge" type lamp holders shall be used in luminaires utilizing electronic solid state dimmable ballasts to operate 48" and 36" fluorescent lamps. Additionally, provide jumper wire between two sides of each individual socket in luminaires utilizing dimmable electronic ballasts
- D. Rigidly and securely attach lampholding sockets to the luminaire enclosure.
- E. Provide sockets suitable for specified lamps, and set to position the lamps in optically correct spacing and relationship to lenses, reflectors, filters, and baffles.
- F. Where fluorescent lamps are to be used "bare," without diffusers or lenses, provide at least two approved lamp retaining clips per fluorescent lamp, for safety.

2.8 LAMPS

A. General:

- 1. Provide electric lamps as required, during construction, including lamps for luminaires furnished by others.
- 2. Provide a complete set of new lamps, as described in this Section and specified the Luminaire Schedule below, in each luminaire, at the completion of the Work, leaving luminaires and lighting equipment completely lamped and/or in normal operating condition. Provide spares in accordance with the paragraph titled "Spares", below.
- 3. The following lamp manufacturers are approved unless otherwise specified: GE, Osram/Sylvania, Philips, Venture.
- 4. Submit catalogue cuts of all lamps to be used in the Work, along with the shop drawing submittal.

B. Incandescent:

1. General:

- a. Provide tubular Quartz-Halogen lamps with frosted bulb, unless otherwise indicated.
- b. Unless otherwise noted, lamps which contain a series connected diode either as an integral part of the lamp, or as a "button" inserted into the socket are unacceptable.
- c. Lamps filled with Krypton are unacceptable.
- d. Provide new lamps in all cases, i.e. new lamps which have not been operated prior to The City of New York occupancy for more than 10 hours.

2. Quartz-Halogen "IR" lamps:

- a. When "IR" or "HIR" is indicated in the lamp column of the luminaire schedule, provide Quartz-Halogen lamps with a multi-layer dichroic coating on the Quartz capsule to reflect infrared radiation back onto the filament, yielding a higher efficacy and longer life than with standard Quartz-Halogen technology.
- b. Acceptable Manufacturers: GE "Halogen-IR"; Philips "ProAccent".

C. Fluorescent:

1. For fluorescent luminaires, unless specified otherwise, provide T8, Rapid Start lamps of the "High Performance extended life (HPX)" type, as described below. Lamps provided shall conform to ANSI C78. Lamp phosphors shall be of a composition which includes rare earth phosphors and which results in a CRI of not less than 80 with a correlated color temperature of 3500K (NEMA RE 835).
2. Provide new lamps in all cases, i.e. new fluorescent lamps which have not been operated during construction for more than 500 hours.
3. Lamps shall only be operated on ballasts specifically designed for the lamp.
4. Lamp/ballast combinations shall also comply with the minimum lamp/ballast efficacy requirements of the "Ballasts" paragraph, above.
5. Lamps shall be of the low-mercury type and TCLP-compliant: E.g., GE "Ecolux", Osram/Sylvania "Ecologic", or Philips "Alto".
6. HPX T8 Lamps shall meet or exceed the following criteria:
 - a. Lamp shall be T8, nominal 1" (26mm) diameter tube, and shall have at least the wattage, initial lumen output, and efficacy (mean lamp lumens/nominal wattage) shown below:

Lamp Length	Nominal Wattage	Mean Lumen Output	Mean Efficacy (mean L/W)
3'-0"	25	2200	88
4'-0"	27-32	2585 - 2950	92

- b. Rated lamp life shall be "extended" to at least 30,000 hours, per IES LM 40-87, operating in rapid start mode.
- c. Lamp lumen depreciation (LLD) shall result in a mean lumen value of at least 92% of the initial lamp lumens at 20,000 hours of rated lamp life (in rapid start mode).
- d. Mortality curves shall show that less than 13% of lamps are burned out at 70% of rated life (in rapid start mode, at 3 operating hours per start).
- e. Acceptable product lines: GE "Ultra", Philips Advantage, Osram/Sylvania "XP" and "XPS".

D. Compact Fluorescent:

1. High Wattage Compact Fluorescent: 26W or higher:
 - a. Lamp shall be T5 twin tube, nominal 5/8" (15mm) diameter tube, bent in a twin tube shape with a single-ended 2G11 base.
 - b. Mean lamp efficacy shall be a minimum of XX (mean lumens per watt).

- c. Rated lamp life shall be at least 20,000 hours, per IES LM 40-87, operating in rapid start mode.
- d. Lamp lumen depreciation (LLD) shall result in a mean lumen value of at least 88% of the initial lamp lumens at 40% of rated life in rapid start mode and at least 82% of the initial lamp lumens at 70% of rated life (in rapid start mode).
- e. Mortality curves shall show that less than 15% of lamps are burned out at 70% of rated life, at 3 operating hours per start.

2. Compact Fluorescent: Low wattage and MOL of 16" or less:

- a. Unless otherwise specified, compact fluorescent lamp phosphors shall be a composition which includes rare earth phosphors and which results in a CRI of not less than 80, with a correlated color temperature of 3000K (NEMA RE 830). If 3000K correlated color temperature lamps are not manufactured, then color temperature of lamps shall be determined by the Lighting Consultant. Under no circumstances shall compact fluorescent lamps have a CRI of less than 80.
- b. Lamp lumen depreciation (LLD) shall result in a mean lumen value of at least 85% of initial lumen output at 40% of rated life.
- c. Installation shall conform to applicable manufacturers' recommendations for enclosed or open operation of both lamps and ballasts.
- d. For outdoor applications or where ambient temperatures may fall below 50° F (10° C), install only four-pin; rapid start lamps with suitable low-temperature rapid start ballasts.

D. High Intensity Discharge Lamps (Metal Halide, High Pressure Sodium, Mercury):

1. General:

- a. Lamps shall comply with ANSI C78 where applicable data exists.
- b. Lamps shall be ceramic metal halide pulse-start whenever that lamp is made for the wattage specified. Lamps shall be designed for operation with a compatible pulse start ballast that meets specifications.
- c. Lamps shall be of the universal burn type or shall be suitable for the socket position of the specific luminaire and mounting position indicated.
- d. Lamps shall be clear or phosphor coated, as indicated in the luminaire schedule. When not indicated in the luminaire schedule, consult Commissioner for clarification.
- e. Provide Metal Halide lamps for all High Intensity Discharge luminaires unless otherwise indicated.
- e. Metal Halide lamps shall have a nominal correlated color temperature (CCT) of 3000K to 3200K unless otherwise indicated.
- f. Metal Halide lamps above 150 watts shall have a minimum color rendering index (CRI) of 65. All metal halide of 150 watts or less shall have a minimum CRI of 85.

F. Other:

For other luminaires, provide lamps as specified. If specification is not complete, contact Commissioner for clarification.

2.9 LIGHT EMITTING DIODE (LED) LAMPS AND LUMINAIRES

A. General

1. Manufacturer shall have a minimum of three (3) years experience in the manufacture and design of LED products and systems and no less than three (3) U.S.A project installations.
2. All LED luminaires, power/data supplies and products associated with installation and control of the LED system, including peripheral devices and software are to be provided by and are the responsibility of a single manufacturer. All components shall perform successfully as a compatible system.
3. Include all components necessary for a complete installation. Provide all power supplies, synchronizers, data cables, and data terminators for a complete working system.
4. LED system shall comply with all relevant patents. Manufacturer shall grant a license for use of relevant patents with the purchase of the patented LED lighting system.
5. Manufacturer shall keep record and have replacement of same bin lamps available for three (3) years after date of installation. System components shall not become obsolete for ten (10) years. Manufacturer shall keep an inventory of replacement parts (source assembly, power and control components) or provide replacement parts that fit into the original luminaire and provide equivalent distribution and lumen output of the original.
6. All parts of system shall replaceable in field. Manufacturer shall accept returned product and components for recycling or re-use.
7. System shall be warranted for three (3) years. Manufacturer shall offer a labor compensation rate of \$10/part for an early failure (within 2 years) of any component of the system.
8. All LED sources used in the LED luminaire shall be high brightness and proven quality from established and reputable LED manufacturers and be fabricated after 2007. Acceptable LED lamp manufacturers unless otherwise noted are:
 - a. Cree, Inc.
 - b. Lumileds Lighting, LLC
 - c. Nichia Corporation
 - d. Osram Opt Semiconductors

B. Performance

1. LED luminaire shall be UL listed or UL classified, as well as CE certified, and PSE marked.
2. All manufacturing processes and use of materials shall conform to the requirements of the European Union's Restriction on the Use of Hazardous Substances in Electrical and Electronics Equipment (RoHS) Directive, 2002/95/EC.
3. Manufacturer of LED systems shall utilize an advanced production LED binning process to maintain color consistency.
4. LEDs shall comply with ANSI/NEMA/ANSI C78.377-2008 – Specifications for the Chromaticity of Solid State Lighting Products.
5. RGB LEDs shall have a rated source life of 100,000 hours and white LEDs shall have a rated source life of 50,000 hours under normal operating conditions. To ensure fixture quality, fixture

shall have been tested under accelerated life test conditions including an operating temperature span of 360 degrees F, and cyclic loading up to 60G.

6. Fixture assembly shall include a method of dissipating heat so as to not degrade life of source, electronic equipment, or components. LED fixture housing shall be designed to transfer heat from the LED board to the outside environment. Fixture housing shall have no negative impact on life of components.
7. Manufacturer shall supply a range of permissible ambient space operating temperatures in which system and junction temperature will provide optimal performance.
8. High power LED fixture shall be thermally protected using one or more of the following thermal management techniques: metal core board, gap pad, and/or internal monitoring firmware.
9. All products included in system shall use Mil-Std 810F, Random Vibration 7.698g as a minimum standard. In installations subject to vibration, luminaire shall be installed with vibration isolation hardware to sufficiently dampen vibrations.
10. For wet and damp use, LED-based luminaire itself shall be sealed, rated, and tested for appropriate environmental conditions, not accomplished by using an additional housing or enclosure.
11. All hardwired connections to LED fixtures shall be reverse polarity protected and provide high voltage protection in the event connections are reversed or shorted during the installation process.
12. The LED luminaire shall be operated at constant and carefully regulated current levels. LEDs shall not be overdriven beyond their specified nominal voltage and current.
13. RGB LED fixtures shall utilize an equal combination of high brightness red, blue and green LEDs, unless otherwise noted, to provide up to 16.7 million additive RGB colors and shall be capable of at least 8-bit control.
14. Constant data transmission rates shall be employed, resulting in the output being independent of distance of cable between power supply and light source within the specified length.
15. Power/data supply shall conform with the following:
 - a. outputs shall have current limiting protection.
 - b. provide mis-wiring protection.
 - c. include power factor correction.
 - d. provide connections that are conduit-ready or clamp-style connections for the low-voltage wiring.
 - e. come with a housing that meets a minimum IP20 rating for dry location installation
 - f. be UL listed for Class 1 or Class 2 wiring
17. Manufacturer shall be able to provide supporting documentation of the product meeting third party regulatory compliance.
18. Manufacturer shall ensure that products undergo and successfully meet appropriate design and manufacturability testing including Design FMEA, Process FMEA, Environmental Engineering Considerations and Laboratory Tests, IEC standards and UL/CE testing.
19. All LED fixtures (100% of each lot) shall undergo a minimum eight-hour burn-in test during manufacturing.

- 20 Manufacturer shall provide optical performance, polar diagrams, and relevant luminance and illuminance photometric data based on test results from an independent Nationally Recognized Testing Lab (NRTL).
- 21 Manufacturer shall provide photometric data in IES file format in accordance with IES LM-63-2002, based on test results from an independent NRTL.
- 22 Manufacturer shall provide mechanical, electrical, network communication and environmental specifications.
- 23 Manufacturer shall provide installation guides.
- 24 Manufacturer shall provide system wiring diagrams tailored for the specific application.

2.10 REFLECTORS

A. Aluminum Reflectors:

1. Provide reflectors and reflecting cones or baffles fabricated from aluminum reflector sheet no less than minimum thickness listed below for each application, or in accordance with the current UL standard 1570 for ballast covers, whichever is thicker. Reflector shall be absolutely free of tooling marks including spinning lines, and free of marks or indentation caused by riveting or other assembly techniques. No rivets, springs, or other hardware shall be visible after installation.

Cones	0.0500" (1.27mm)
Wall wash kicker panels in cones	0.0400" (1.01mm)
Reflectors (non-structural)	0.0235" (0.59mm)
Louvers/Baffles	0.0200" (0.50mm)

2. Provide reflectors and baffles of first-quality polished, buffed and anodized finish, "Alzak" or approved equal, and with specular or semi-specular finish color to be clear, unless specified otherwise. Provide reflector and baffles which produce no apparent brightness nor a lamp image, nor may any part of the lamp be visible from 50° above nadir to 90° above nadir (vertical). That is the reflector shall have a maximum 50° cutoff angle and a minimum 40° shielding angle.
3. Provide other aluminum reflectors where required, and formed and finished as noted on drawings and elsewhere in the specifications. Provide only reflectors free from blemishes, scratches, or indentations which would distort their reflective function and finished by means of the "Alzak" process, or approved equal, unless otherwise noted. No rivets, springs, or other hardware shall be visible after installation.

B. Painted Reflectors:

1. Reflectors shall be completely formed before application of primer and enamel color coat or coats.
2. When requested by Commissioner, submit a sufficient quantity of flat steel panels having the identical primer and color coat or coats applied in the same manner as proposed for the contract items.

2.12 LENSES / FACEPLATES / TRIM

- A. Where plastic lens is indicated, provide lens of 100% virgin acrylic (polymethyl methacrylate), nominal 0.125" (3mm) thick, unless otherwise indicated. Lens is to be strain-free, uniform in appearance, and destaticized.
- B. Where clear acrylic lens is indicated, provide lens with a minimum visible light transmittance of 92%, unless otherwise indicated.
- C. Where prismatic acrylic lens is indicated, lens shall be composed of 3/16" (4.7mm) square non-convex prismatic cones of maximum 0.080" (2mm) depth and aligned 45° to the length and width of the lens panel, unless otherwise specified. Lens shall be a minimum of 7.5 oz. per square foot (2289g/m²). Lens shall have minimum 80% visible light transmittance.
- D. Where diffuse acrylic lens is indicated, lens shall be diffuse frosted white, high transmission acrylic with a minimum 73% visible light transmittance unless otherwise indicated. Provide nominal 0.125" (3mm) thick lens unless otherwise specified.
- E. Where acrylic "overlay" is indicated, lens shall be supported by other rigid luminaire members, such as louvers or shelves. Lens shall be white or clear, as specified, with a minimum 79% visible light transmission for white lenses, and a minimum 83% transmission for clear lenses. Provide 0.040" (1mm) thick lens unless otherwise indicated.
- F. Make lenses, louvers, or other light diffusing elements contained in frames removable, but positively held within the frames so that hinging or other motion of the frame will not cause the diffusing element to drop out.
- G. For recessed luminaires with trim that is removable or open for access to the interior of the luminaire, and serves as a ceiling trim, provide trim that is positively held to the luminaire body by adjustable means that permit the trim to be drawn up to the ceiling as tight as necessary to insure complete contact of faceplate with ceiling surrounding the luminaire.

2.13 RATED LOCATION LUMINAIRES

A. General:

- 1. Provide luminaires designed and manufactured specifically for "rated" (e.g., damp, wet, shower, hazardous) location service. Components, including nuts, bolts, rivets, springs, and similar parts shall be made of materials of effective corrosion resistance, or of materials which have been subjected to finishing treatment which will assure such resistance.
- 2. Luminaires not otherwise protected with lenses or louvers shall be protected with securely fastened bird screens when used in exterior locations.
- 3. Provide anodized aluminum for aluminum parts of exterior luminaires that are not specified as requiring a painted finish.
- 4. All luminaires shall be constructed according to UL procedures, and listed by UL or ETL for the appropriate category.

B. Damp Location:

- 1. In addition to the requirements of Paragraph A, above, damp location luminaires shall meet or exceed the following criteria:

- a. Provide metal parts of luminaires, which are specified as requiring painting, for use in outdoor or damp locations, which are painted with suitable weather and moisture resisting qualities.
- b. Provide luminaires for use outdoors, or in areas designated as damp locations, which are suitably and effectively gasketed to prevent access of moisture into electrical components or enclosing diffusers, lenses or globes.
- c. Luminaires shall be UL or ETL listed for damp locations.

C. Wet Location:

1. In addition to the requirements of Paragraph A, above, wet location luminaires shall meet or exceed the following criteria:
 - a. Any exposed luminaires shall be UL or ETL rated for wet locations.
 - b. Provide luminaires for use outdoors, or in areas designated as wet locations, which are suitably and effectively gasketed to prevent access of moisture into electrical components or enclosing diffusers, lenses or globes.

2.14 LUMINAIRE DESCRIPTIONS

A. General:

1. Provide luminaires which conform to the above standards and criteria, at locations indicated on the drawings, and as indicated below in APPENDIX A.
2. Contractor is responsible for verifying mounting conditions and trim for all luminaire types.
3. Contractor shall verify all voltages, and verify which luminaires require ducted or plenum air supply or return capability or are to be static.
4. Catalogue or series numbers, when shown herein, are intended to provide assistance in establishing general type or category of luminaires. Contractor shall provide a luminaire that meets the complete performance descriptions, as well as information provided by detail drawings. Standard catalogue cuts, when included, are for general assistance. Written luminaire descriptions IN APPENDIX A are the primary basis for luminaire specification. Additional luminaires may be listed in the electrical drawings.
5. Bring any discrepancies between the contract documents to the attention of the Commissioner before submitting bids. If such discrepancies are not resolved prior to the end of the bid period, the more costly alternative will be considered as included in the bid price. See Paragraph 2.1 above regarding definition of Acceptable Manufacturers.
6. All finishes are to be factory applied, including colored flanges and trims.
7. Luminaires shall be constructed and supported to withstand seismic disturbances without damage.

B. Spare Parts:

1. Spare parts stock shall be furnished by the Contractor to the Commissioner upon completion of the work. All boxes shall be clearly labeled regarding contents, relevant fixture type, and description. All spare parts shall be turned over to the Commissioner, and a receipt in duplicate, signed by the site representative shall be delivered to the Commissioner.

2. The following spare parts shall be furnished as a minimum. Additional spare parts shall be furnished as required by mention elsewhere in this specification, other sections of these Specifications, or the Contract Drawings:

Lamps	10% (but not less than six of each type of lamp)
LED luminaires and lamps	Three units of each unique size, shape, or color.
Ballasts / Transformers	5% (but not less than one of each type of ballast/transformer)
Lenses, baffles	10% (but not less than one of each type lens or baffle)
Spare Luminaires for types C8, C9, X1	1 of each
LED Luminaires (all)	2 of each unique length, wattage, plus 1 driver for each unique condition.

C. LUMINAIRE SCHEDULE: SEE APPENDIX A and APPENDIX B BELOW.

Complete specifications for the components (lamps, ballasts, reflectors, lenses, etc.) of luminaires described below are found above in Part 2. The Luminaire Schedule in Appendix A supersedes any similar legend or schedule issued previously, or issued concurrently on the Drawings for those types. Bring any discrepancies to the attention of the Commissioner before preparing any bids or proceeding with any work.

Descriptions for additional luminaire types only, specified by the Electrical Engineer, are located on the Electrical Drawings.

PART 3 - EXECUTION

3.1 GENERAL

- A. Install luminaires complete with lamps, as indicated, and with equipment, materials, parts, attachments, devices, aligner and filler clips, hardware, hangers, cables, supports, channels, frames and brackets necessary to make a safe, complete, and fully operative installation.
- B. Verify and provide luminaires that are appropriate for the ceiling and mounting conditions of the project.
- C. Coordinate with other trades as appropriate to properly interface installation of luminaires with other work.
- D. Reject and do not install blemished, damaged, or unsatisfactory luminaires. Replace imperfect or unsatisfactory luminaires, if installed, as directed by Commissioner.
- E. Set luminaires, when installed, to be true, and free of light leaks, warps, dents, or other irregularities. No light leaks are permitted at the ceiling line or from any visible part or joint of the luminaires. Install luminaires plumb, square, and level with ceiling and walls, in alignment with adjacent luminaires, and secure in accordance with manufacturers' directions and approved shop drawings. Install all adjacent

and continuous luminaires straight and trued, aligned in both plan and elevation. Supply and install alignment rods or joint straps as required to achieve this effect.

- F. Provide finish for exposed parts or trims as specified. If not indicated, provide a finish as directed by Commissioner.
- G. Do not install reflector cones, aperture plates, lenses, diffusers, louvers, and decorative elements of luminaires until completion of wet work, plastering, painting and general clean-up in the area of the luminaires.
- H. Mount luminaires at heights and locations indicated on the Contract Drawings, or as required by Commissioner. Mounting heights specified or indicated are to be to the bottom of each luminaire for suspended and ceiling-mounted luminaires, and to the center of each luminaire for wall-mounted luminaires, unless otherwise noted. Obtain approval of the exact mounting for luminaires on the job before installation is commenced and, where applicable, after coordinating with the type, style, and pattern of the ceiling being installed.
- I. Conform to the requirements of NFPA 70, and all other relevant codes. Supports shall be suitable for local seismic zone.
- J. In Mechanical Equipment Rooms, luminaires shall be hung from ceilings after piping and equipment therein has been installed. Exact locations for such luminaires shall be determined at the job site during the course of the Work, in Coordination with the Mechanical Work.
- K. Adequately protect the housing of recessed luminaires during installation by internal blocking or framing to prevent distortion of sides, or dislocation of threaded lugs, which, upon completion, shall be in perfect alignment and match the corresponding holes in frames or rims. Holding screws shall be inserted freely without forcing, and shall remain easily removable for servicing.
- L. Ground non-current-carrying parts of electrical equipment in accordance with UL and NEC provisions.
- M. Upon completion of installation of luminaires, and after building circuits have been energized, apply electrical energy to demonstrate capability and compliance with requirements. Where possible, correct malfunctioning units at the site, then re-test to demonstrate compliance. Otherwise, remove and replace with new units, and proceed with re-testing. Dates and times for all field tests shall be established by the Commissioner. Coordinate all test requirements with the Commissioner.
 - 1. For normal and emergency building lighting, upon completion of the installation, conduct an operating test to show that the equipment operates in accordance with the requirements of this and other relevant sections.
 - 2. Test all wiring with an insulation testing instrument, both before and after connection of luminaires and equipment. The minimum resistance shall be 250,000 ohms.
- N. Upon completion of the installation, the luminaires and lighting equipment shall be in first class operating order and free from defects in condition and finish. At time of final inspection, all luminaires and equipment shall be clean, fully lamped, and be complete with required lenses or diffusers, reflectors, side panels, louvers, or other components necessary for the function of the luminaires. Any reflectors, lenses, diffusers, side panels or other parts damaged prior to the final inspection shall be replaced by Contractor prior to inspection.

- O. At the time of substantial completion and prior to field tests, replace lamps in interior luminaires which have been operating as work lights, or which are observed to be noticeably dimmed after Contractor's use and testing, as judged by the Commissioner.
- P. Luminaires and lamps that are part of the Work of this section shall not be used for work lights during construction, except in Mechanical Equipment rooms. Contractor shall provide adequate portable or temporary lighting for construction.
- Q. Vibration Isolation: Mount and support all luminaires in such a manner to isolate the luminaire from structure-borne vibration, including but not limited to vibration caused by fans, motors, moveable tracks, moveable partitions, portable carts, vehicles, etc. Incandescent and tungsten halogen lamps are particularly sensitive to such vibration.

3.2 ACCESSIBILITY

Install equipment such as junction and pull boxes, luminaire housings, transformers, ballasts, switches and controls, and other apparatus that shall be reached from time to time for operation and maintenance, to be easily accessible and appropriate for mounting and ceiling conditions.

3.3 SUPPORTS

- A. Luminaires shall be securely fastened as per manufacturer's instructions. Provide plaster frames or mounting frames for luminaires that require them. Such frames shall be appropriate for the ceiling construction in which they are installed.
- B. Provide necessary hardware with luminaires, such as stems, plates, plaster frames, hangers and similar items, for safe support of the luminaire. Provide plaster frames made of non-ferrous metal, or of steel that has been suitably rustproofed after fabrication, as described above.
- C. Provide supports for luminaires that are adequate to support the weight of the luminaires.
- D. Provide hanging devices which, if visible from normal viewing angles, exactly match luminaire finishes specified, unless otherwise noted.
- E. Where necessary to meet fire resistance requirements of Building Code authorities, provide enclosures housing recessed luminaires that are constructed to provide required fire resistance rating.
- F. Provide attachment devices including brackets and cast metal shapes with the requisite rigidity and strength to maintain continuous alignment of installed luminaires. Attach luminaires to ceiling support members, and do not depend upon lathing, plaster or ceiling tile for alignment or support.
- G. Provide luminaires mounted in suspended ceilings that are supported by saddle hangers or the bars attached to runners or between crossbars of ceiling systems. Provide mounting splines or other positive means of maintaining alignment and rigidity.
- H. Provide supporting members that are surface passivated, and which are primed or paint-dipped to resist corrosion.
- I. Provide fastening devices of a positive locking type, which do not require special tools to apply or remove them. Do not use tie wires in place of fastening devices.

- J. Contractor is responsible for the necessary suspension system. Contractor shall ascertain the structural reliability of supports provided under other Sections of the specification.
- K. Attach reflectors to housings by means of safety chains, which shall prevent reflectors from falling. No part of the chain may be visible after installation, when viewed from any angle up to 50 degrees from the vertical.
- L. Provide pendant or surface mounted luminaires with required mounting devices and accessories, including hickeyes, stud-extensions, ball aligners, canopies, and stems. Uniformly maintain the luminaire heights shown on the Contract Drawings or established in the field. The allowable tolerances in individual luminaire mounting shall not exceed 1/4 inch (7mm) and may not vary more than 1/2 inch (14mm) from the mounting height shown on the drawings. Install luminaires hung in continuous runs absolutely level, and in line with each other. Hanging devices shall comply with code requirements.
- M. Provide an approved ceiling canopy for each stem, exactly matching specified finishes.
- N. Place stems to be vertical and plumb.
- O. Provide at least two rigid supports for individually mounted fluorescent luminaires. Where luminaires are ganged, provide supports at 8 ft. (2438mm) intervals, unless otherwise indicated.
- P. Recessed and semi-recessed luminaires:
 - 1. Support rods or wires shall be provided with a minimum of four rods or wires per luminaire and located not more than six inches (152mm) from each corner of each luminaire.
 - 2. Do not support luminaires by ceiling acoustical panels.
 - 3. Where luminaires of sizes less than the ceiling grid are indicated to be centered in the acoustical panel, support such luminaires independently or with at least two 3/4 inch (19mm) metal channels spanning and wired to the ceiling tees.
 - 4. Provide rods or wires for luminaire support under this section of the specifications.
- Q. Seismic Protection for Lighting Fixtures: Support fixtures in an appropriate manner to withstand seismic disturbances without damage.

3.4 AIMING AND ADJUSTMENT:

- A. Provide manpower and tools for final focusing and adjustment, under the Commissioner's supervision, of all adjustable luminaires after regular working hours (i.e., after dark in daylighted areas) whenever necessary, at no additional cost to The City of New York. All fixtures shall be locked into place so that the aiming is not disturbed during future re-lamping.
- B. The Contractor shall request preliminary aiming diagrams during the shop drawing submittals. If the Commissioner chooses to submit them, the Contractor shall pre-aim those luminaires during installation or prior to final aiming.
- C. When extra lenses, louvers or shields are specified, the Contractor shall change accessories until the Commissioner makes a final selection.
- D. The Contractor shall note final aiming and locked positions, and include that information in the O&M manual.

3.5 CLEANING

- A. Immediately prior to occupancy, clean reflector cones, reflectors, aperture plates, lenses, louvers, lamps and decorative elements. As per manufacturer's instructions, destaticize lenses after cleaning, installing them to leave no finger or dirt marks.
- B. Upon completion of the luminaire installation and at the time of final inspection, luminaires shall be clean, and free from marks, dust, spotting or other defects. Replace any broken or defective parts prior to final inspection. Replace or make good all defects revealed by final inspection.
- C. Protect installed luminaires from damage during the remainder of construction period.

3.6 COMMISSIONING

- A. For any luminaire, ballast, or lighting control system, the contractor is responsible for a complete and operational system which is satisfactory to the Commissioner, building manager and occupants.
- B. The Commissioner shall provide for or engage a commissioning agent to verify that all components and system as a whole meets design intent. This includes evaluation and verification of all adjustable features, such as aiming angles, time clock settings, sensitivity settings, high end trim, fine tuning, customized settings, etc. Contractor shall provide manpower and equipment after normal working hours to correct and adjust system, working with or without direct supervision of commissioning agent until reasonable satisfaction has been achieved.
- C. The Contractor shall provide the Commissioner with Spares, as described in Part 2 above.
- D. The Contractor shall provide the Commissioner with maintenance manual and operational submittals, as called for in Part 1 above, under the conditions of the relevant General Requirements. After approval by the Commissioner, this manual will be kept on site for reference use by facility maintenance personnel. Transfer of the document will include a thorough walk-through and demonstration of equipment by contractor for facility personnel, and the designer/specifier. or Commissioner shall schedule transfer. The Contractor shall assemble and submit, in bound 8.5"x11" format, an Operation and Maintenance Manual that includes the following:
 - 1. A chart clearly documenting the luminaire, lamp and ballast actually installed for each luminaire type, with product designations sufficient for reordering new product and components to match those installed.
 - 2. A current list of lighting distributors, manufacturers and manufacturer's representatives, (for the purposes of replacement, reordering or trouble-shooting). This list shall be keyed to the list of luminaires, lamps and ballasts, so that the Commissioner has a name, address and phone number of at least two (2) contacts for each product or component.
 - 3. Shop drawings, technical data sheets, product technical documents, installation instructions, cut sheets, operating instructions, calibration instructions, and troubleshooting guides in the installation, including but not limited to lamps, ballasts and lighting control devices.
 - 4. Color-coded as-built drawings showing all lamp and ballast types, to facilitate replacement.
- E. Commissioner Training: At the Commissioner's convenience, the Contractor shall provide a minimum of four (4) hours, not to exceed eight (8) hours, of expertise and training concerning the installation,

characteristics, operations and maintenance of the luminaires and lighting controls. Such training shall take place after the Contractor has provided the Commissioner with the maintenance and operational submittals mentioned above. Include technical data sheets and parts ordering information. In addition, the Contractor shall provide the Commissioner with a chart clearly documenting the luminaire, lamp and ballast actually installed for each luminaire type, with product designations sufficient for reordering new products or components. For the purposes of replacement, reordering or trouble-shooting, the Contractor shall provide the Commissioner with a current list of lighting distributors, manufacturers and manufacturer's representatives. This list shall be keyed to the list of luminaires, lamps and ballasts, so that the Commissioner has a name, address and phone number of at least two (2) contacts for each product or component.

- E. The Contractor shall video-tape the training session, and provide the Commissioner with two (2) copies in video-tape, or DVD. Alternative electronic formats may be provided if mutually agreed upon.

PART 4 - APPENDICES

- 4.1 GENERAL: The appendices listed below are integral parts of the specifications and contract documents. If either Appendix is missing or incomplete, notify the. Do not submit a bid based on incomplete information.

4.2 APPENDIX A - LIGHTING FIXTURE (LUMINAIRE) SCHEDULE

- A. See Part 2 above for complete specifications for the components (lamps, ballasts, reflectors, lenses, etc.) of the luminaires described in the schedule. The Lighting Fixture Schedule below supersedes any similar legend or schedule issued previously, or issued concurrently on the Drawings. Bring any discrepancies to the attention of the Commissioner before preparing any bids or proceeding with any work.

4.3 APPENDIX B - LIGHTING CONTROL INTENT NARRATIVE

- A. This lighting control narrative relates to work in this section, Section 26 0923, and other electrical sections. The primary manufacturer of the lighting controls shall take responsibility for the compatibility of any other lighting controls specified for the project. Each manufacturer of lighting controls shall provide a written statement accompanying their submittals, verifying that their products individually or as a system, will meet the performance described in the Control Intent Narrative. If any performance criterion cannot be exactly met, the written statement shall indicate how the manufacturer's product differs, and how the performance issue will be addressed. The lighting controls shall be initially set at any calibration levels indicated in the control intent narrative first, or other electrical documents if not indicated in the narrative. The manufacturer shall provide an additional commissioning trip after the system is fully tested and operational, for the purpose of final calibration and commissioning with the owner, Commissioner and lighting designer present. These final settings shall be documented and used as the basis for future re-commissioning. Bring any discrepancies to the attention of the Commissioner before preparing any bids or proceeding with any work.

Appendix A: Lighting Fixture Schedule/Descriptions

C6	Gallery C, Restroom	6" aperture recessed CFL downlight with opal acrylic lens, white cone, white flange, and integral electronic ballast. Dimensions: 6" aperture, 12-3/4" length, 10" width, 6" height	1	32 watt Triple Tube compact fluorescent, 3000K	Integral electronic ballast	36	ea	Lightotier Calculte Lensed Downlight 8091 DWHW /S6132BU 32W	1. See Common Note 9 below.	Cooper Portfolio, Edison Price, or approved equal
C8	Stairs, Restrooms, Hallways, Workshops	Surface mounted vapor-tight "jelly jar" with guard, natural aluminum or painted fixture finish and integral electronic ballast. Mounted to wall so that globe is horizontal. Suitable for recessed junction boxes. Low Wattage label required "20W maximum". Finish to be selected by Commissioner.	1	Screw-based 1200 lumen self-ballasted 20W spiral compact fluorescent, 3000K; OSI CF20EL/Mirco/8 30/ECO	Lamp with Integral electronic ballast	20	ea	RAB VC100 G - finish	1. Fixture shall be mounted so that bottom of fixture is at 6'-8" AFF or higher. 2. See Common Notes 9, 11 below. 3. Interior wattage limit label for 20 Watts Max. 4. Owner to consider LED retrofit lamp in future when technology is suitable for enclosed fixtures	Stonco, Canlet, Abolite, or approved equal
C8A	Stairs, Restrooms, Hallways, Workshops	Same as C8 except with integral surface mounted j-box, for locations where junction boxes cannot be recessed. Low Wattage label required "20W maximum".	1	Screw-based 1200 lumen self-ballasted 20W spiral compact fluorescent, 3000K; OSI CF20EL/Mirco/8 30/ECO	Lamp with Integral electronic ballast	20	ea	RAB VX100 G - finish	1. Fixture shall be mounted so that bottom of fixture is at 6'-8" AFF or higher. 2. See Common Notes 9, 11 below. 3. Interior wattage limit label for 20 Watts Max. 4. Owner to consider LED retrofit lamp in future when technology is suitable for enclosed fixtures	Stonco, Canlet, Abolite, or approved equal
C9	Gallery C	Wall surface mounted CFL decorative sconce with hand-blown white opal glass diffuser, powder coat white aluminum finish, and integral electronic ballast. Dimensions: 13.7" diameter, 4.2" extension	1	18 watt Triple Tube compact fluorescent, 3000K	Integral electronic ballast	20	ea	Louis Poulsen AJ Eklipsa Wall - AJE-13.7" - 1/18W/CF GX24q-2-VOLTS-WHT-WALL	1. Fixture shall be mounted so that bottom of fixture is at 6'-8" AFF or higher. 2. See Common Notes 9, 11 below.	Bega, Artemide, or approved equal
FI/TR 1	Gallery A	Pendant mounted track with extruded housing modified to include fluorescent uplight and integral electronic dimming ballast. Housing shall have 1 circuit track below, WHITE finish, and stainless steel cable mounting with gray cord. Track shall be available with bridge, outlet, and weight hanger support accessories as required. Dimensions: Continuous lengths as shown on drawings, 2-1/32" width, 3-5/16" height	1	32 watt Super T8 fluorescent, 3000K, per 4' length	Fluorescent shall have integral electronic NEMA Premium 5% dimming ballast; track shall be 120/250 volt	7 watts (fluorescent) 30 watts (track allowance - exempt in galleries)	lf	LSI Unitrack 5037*-MOD T8 UPLIGHT/50315/313*0	1. Fixture shall be mounted so that bottom of of fixture is at 10" AFF and aligns with ceiling fan blades. Contractor to coordinate cable/stem lengths. 2. Fixture types M1 and H3 shall mount to track. 3. Fixture shall utilize 4' fluorescent lamps only. 4. Provide 5% dimming ballast for fluorescents. Track shall not dim. 5. See Common Notes 5, 6, 8, 9, 10, 11 below.	Edison Price, LiteLab, Axis, Systemlux, or approved equal

F1/ TR1A	Gallery C	Identical to TR1/F1 except with 2 circuit track.	1	32 watt Super T8 fluorescent, 3000K, per 4' length	Fluorescent shall have integral electronic NEMA Premium 5% dimming ballast; track shall be 120/250 volt	7 watts (fluorescent) 60 watts (2- circuit track allowance - except in galleries)	lf	LSI Unitrack 5037*-MOD T8 UPLIGHT/50315/323*0	1. Fixture shall be mounted so that bottom of of fixture is at 10" AFF and aligns with ceiling fan blades. Contractor to coordinate cable/stem lengths. 2. Fixture types M1 and H3 shall mount to track. 3. Fixture shall utilize 4' T8 fluorescent lamps only. 4. Provide 5% dimming ballast for fluorescents. Track shall not dim. 5. See Common Notes 5, 6, 8, 9, 10, 11 below.	Edison Price, LiteLab, Axis, Systemlux or approved equal
F3	Lease Space and Studios	Suspended linear fluorescent up/down light with white perforated reflector, white finish, and integral electronic ballast. Fixture shall be circuited for bi-level switching. Cable suspension with gray power cord at interior end of each row. Dimensions: Continuous lengths as shown on drawings in 4' or 8' housing lengths, and 4' diffuser lengths, 9-3/4" width, 5-3/8" height	2	32 watt Super T8 fluorescent, 3000K, per 4' length	Integral electronic NEMA Premium ballast	56	ca	Cooper - Metulux Basix Perf Arch BSX-R-PA-2-32T8-VOLTS-* NEMA PREMIUM-8-2-*	1. Fixture shall be mounted so that bottom of fixture is at 8'-3" AFF in lease space and 9'-0" in studios: verify with Architect so that bottom of fixture aligns with ceiling fan blades. Contractor to coordinate cable/stem lengths. 2. Fixture shall be wired for bi-level switching. 3. See Common Notes 8 and 9 below.	Legion Lighting, Prudential Lighting, or approved equal
F4	Workshops, Lobbies, Hallway	Pendant-mounted 4' diameter dome with acrylic diffuser, textured matte white painted fixture finish, perforated top for uplight, and integral electronic ballasts. Fixture shall be suspended with aircraft cable assembly and gray cord. Fixture shall be circuited for bi-level switching. Dimensions: 4' diameter, 4-1/8" depth.	6	25 watt (3') T8 fluorescent, 3000K	Integral electronic ballasts	168	ca	Prudential Lighting P-3940-6T8-WA-TMW-DC- VOLTS-CA48-10%UPLT	1. Fixture shall be wired for bi-level switching. 2. Fixture shall be mounted so that bottom of fixture is at 9'-0" AFF and aligns with fan blades, except on 1st floor where bottom of fixture shall be at 10'-0" AFF. Contractor to coordinate cable/stem lengths. 3. See Common Note 6, 8, 9, 11 below.	LiteControl, Focal Point Lighting, or approved equal
F6B	Offices and Computer Lab	Pendant mounted two-lamp up/down light with frosted acrylic lens downlight, with 70% uplight, 30% downlight distribution, white painted fixture finish, dust cover, and integral electronic NEMA Premium ballast. Fixture shall be suspended with aircraft cable and gray cord mounting option. Dimensions: Continuous lengths as shown on drawings in modules of 4' lamp lengths; 6-1/2" width, 1-1/2" height. Fixture shall be wired for bi-level switching. Dimensions: 8' length, 6-1/2" width, 1-1/2" height.	4	32 watt Super T8 fluorescents, 3000K	Integral electronic NEMA Premium ballast	112	ca	Axis Lighting Cubic Narrow CUB-F-8-T8-2-W-**-NEMA PREMIUM-VOLTS-2-CA#-*-D	1. Fixture shall be mounted so that bottom of fixture is at 8'-0" AFF in offices and 9'-0" AFF in computer lab, and so that bottom of fixture aligns with ceiling fan blades. Contractor to coordinate cable/stem lengths. 2. Fixture shall be wired for bi-level switching. 3. See Common Notes 8, 9, 11 below.	Focal Point Lighting, Lite Control, or approved equal
F6C	Offices	Identical to F6B except 4' length. Dimensions: 4' length, 6-1/2" width, 1-1/2" height	2	32 watt Super T8 fluorescents, 3000K	Integral electronic NEMA Premium ballast	56	ca	Axis Lighting Cubic Narrow CUB-F-4-T8-2-W-**-NEMA PREMIUM-VOLTS-2-CA#-*-D	1. Fixture shall be mounted so that bottom of fixture is at 8'-0" AFF and aligns with ceiling fan blades. Contractor to coordinate cable/stem lengths. 2. Fixture shall be wired for bi-level switching and tandem wiring to adjacent 4' fixture if 2 zones are indicated on dwgs. 3. See Common Notes 8, 9, 11 below.	Focal Point Lighting, Lite Control, or approved equal

F6D	Computer Lab	Identical to F6B except 12' length. Dimensions: 12' length, 6-1/2" width, 1-1/2" height	6	32 watt Super T8 fluorescents, 3000K	Integral electronic NEMA Premium ballast	168	ea	Axis Lighting Cubic Narrow CUB-F-12-T8-2-W-**-NEMA PREMIUM-VOLTS-2-CA#-*-D	1. Fixture shall be mounted so that bottom of fixture is at 9'-0" AFF and aligns with ceiling fin blades. Contractor to coordinate cable/stem lengths. 2. Fixture shall be wired for bi-level switching. 3. See Common Notes 8, 9, 11 below.	Focal Point Lighting, Lite Control, or approved equal
F8	Restrooms	Recessed linear fluorescent continuous end-to end wall slot with open bottom, shielded lamp, semi- specular parabolic reflector, integral electronic NEMA Premium ballast and straight extensions. Dimensions: Continuous lengths as shown on drawings, 13-1/2" width, 12-3/4" height/depth. 4' lamps only.	1	32 watt Super T8 fluorescent, 3000K, per 4' length	Integral electronic NEMA Premium ballast	7	lf	LiteControl Wall Slot 2000 20-1-LENGTH-T8-CWM-NEMA PREMIUM-PR-VOLTS -SE	1. See Common Notes 6, 8, 10 below. 2. Continuous wall to wall. Center lighted portion in opening. Submit layout. Wall shall be finished above ceiling line.	Focal Point Lighting, Linear Lighting, or approved equal
F9	Closets	Wall surface mounted linear fluorescent with satin acrylic lens and integral electronic NEMA Premium ballast. Dimensions: 4' length, 2-1/4" width, 3" height	1	32 watt Super T8 fluorescents, 3000K	Integral electronic NEMA Premium ballast	28	ea	Prudential Lighting Snap S1-1T8-04-SAL-YGW-VOLTS- SURF-*.*	1. Fixture shall be wall-mounted above closet door header.	Legion Lighting, Architectural Lighting Works, or approved equal
F9A	Closets, Storage	Identical to F9 except 2' length. Dimensions: 2' length, 2-1/4" width, 3" height	1	17 watt T8 fluorescents, 3000K	Integral electronic ballast	19	ea	Prudential Lighting Snap S1-1T8-02-SAL-YGW-VOLTS- SURF-*.*	1. Fixture shall be wall-mounted above closet door header.	Legion Lighting, Architectural Lighting Works, or approved equal
F10	Pantry 412	Surface mounted linear fluorescent under cabinet task light with solid front, lens, white painted fixture finish, and integral electronic NEMA Premium ballast. 120 volt. Dimensions: Continuous lengths as shown on drawings, 5-7/16" width, 1-9/16" height	1	32 watt Super T8 fluorescents, 3000K, per 4' length	Integral electronic NEMA Premium ballast	28	ea	Alisco Lighting Super Inch SF332 - 120 V	1. Fixture shall be mounted under cabinet so it is out of view. 2. Provide local one-gang wall switch at location to be determined. (Not shown on drawings.)	Legion Lighting, Architectural Lighting Works, or approved equal
F15	Entry Vestibule	2" aperture surface mounted linear fluorescent slot/downlight with frosted acrylic lens, extruded aluminum housing, white painted fixture finish, white painted reflector, and integral electronic NEMA Premium ballast. Dimensions: 4' length, 2-1/4" width, 3-5/8" height	1	32 watt Super T8 fluorescent, 3000K	Integral electronic NEMA Premium ballast	28	ea	Axis Lighting Beam2 BS-F-4-T8-1-W-VOLTS-NEMA PREMIUM-1-*	1. See Common Notes 8, 11 below.	Focal Point Lighting, Lite Control, or approved equal
F18	Stairs	Wall mounted linear fluorescent up/downlight with white reflector, louvers, acrylic lens for uplight, white painted fixture finish, and integral electronic NEMA Premium ballast. Dimensions: 4' length, 4" width, 4" height	2	32 watt Super T8 fluorescents, 3000K	Integral electronic NEMA Premium ballast	56	ea	Mark Lighting Duet Wall DUW-4-2T8-1-U-LD-VOLTS-EB-*	1. Fixture shall be mounted so that bottom of fixture is at 6'-8" AFF or higher. 2. See Common Notes 8, 9, 11 below.	Focal Point Lighting, Lite Control, or approved equal
F19	2nd Floor Lobby and Hallway	Pendant mounted linear fluorescent uplight with frosted lens, extruded aluminum housing, white painted fixture finish, cable mounting with gray cord, and integral electronic ballast. Dimensions: 2' length, 2-1/4" width, 3-5/8" height	1	17 watt (2') T8 fluorescent, 3000K	Integral electronic ballast	19	ea	Axis Lighting Beam2 Indirect BI-F-2-T8-1-W-VOLTS-E-1-CA#- *di	1. Fixture shall be mounted so that TOP of fixture aligns with ceiling fin blades. Contractor to coordinate cable/stem lengths. 2. See Common Notes 8, 9, 11 below.	Focal Point Lighting, Lite Control, or approved equal

F19 Art Medium	2nd Floor Lobby and Hallway	Provide separate wiring to replace F19 with the following: Pendant mounted linear fluorescent with snap-on end frosted acrylic lens, anodized aluminum housing, white painted finish, cable mounting with gray cord, and integral electronic ballast. Dimensions: 2' length.	1	17 watt (2) T8 fluorescent, 3000K	Integral electronic ballast	19	ca	Prudential Lighting Inc. SL-11T-40-942-YGW-VOLTS- CA#-*	1. Fixture shall be mounted so that TOP of fixture aligns with ceiling fan blades. Contractor to coordinate cable/stem lengths. 2. See Common Notes 8, 9, 11 below.	Legion Lighting, Architectural Lighting Works, or approved equal
F19A	4th Floor Lobby	Identical to F19 except 4' length with NEMA Premium ballast. Dimensions: 4' length, 2-1/4" width, 3-5/8" height	1	32 watt Super T8 fluorescent, 3000K	Integral electronic NEMA Premium ballast	28	ca	Axis Lighting Beam2 Indirect BI-F-4 T8-1-W-VOLTS-NEMA PREMIUM-1-CA#-*	1. Fixture shall be mounted so that TOP of fixture aligns with ceiling fan blades. Contractor to coordinate cable/stem lengths. 2. See Common Notes 8, 9, 11 below.	Focal Point Lighting, Lite Control, or approved equal
F19B	3rd Floor Lounge	Identical to F19A except direct pendant version with frosted lens and asymmetric reflector. Dimensions: 4' length, 2-1/4" width, 3-5/8" height	1	32 watt Super T8 fluorescent, 3000K	Integral electronic NEMA Premium ballast	28	ca	Axis Lighting Beam2 Direct BD-A-F-4 T8-1-W-VOLTS-NEMA PREMIUM-1-CA#-*	1. Fixture shall be mounted so that bottom of fixture aligns with ceiling fan blades. Contractor to coordinate cable/stem lengths. 2. See Common Notes 8, 9, 11 below.	Focal Point Lighting, Lite Control, or approved equal
F19C	3rd Floor Lounge	Identical to F19B except 8' length. Dimensions: 8' length, 2-1/4" width, 3-5/8" height	1	32 watt Super T8 fluorescents, 3000K, per 4' length	Integral electronic NEMA Premium ballast	56	ca	Axis Lighting Beam2 Direct D-A-F-4 T8-1-W-VOLTS-NEMA PREMIUM-1-CA#-*	1. Fixture shall be mounted so that bottom of fixture aligns with ceiling fan blades. Contractor to coordinate cable/stem lengths. 2. See Common Notes 8, 9, 11 below.	Focal Point Lighting, Lite Control, or approved equal
F20	Over Sinks	Wall bracket mounted UL Listed Wet Location downlight with white acrylic lens, white painted fixture finish, and integral electronic NEMA Premium ballast. 120 Volt. Dimensions: 4' length, 9" extension, 6" high.	1	32 watt Super T8 fluorescent, 3000K	Integral electronic NEMA Premium ballast	28	ca	Prudential P61-1 T8-04-WA-TMW- D1-SC-VOLTS-WS- *- NEMA PREMIUM	1. Fixture shall be wall mounted over sink. Height 6'-0" AFF or to meet ADA. 2. See Common Notes 8, 9, 11 below 3. Wet Location Listed.	Legion Lighting, Cooper Metal, or approved equal
F21	Storage, Electrical Room, Boiler Room	Surface mounted linear fluorescent strip light with reflector, wire guard, white painted fixture finish, and integral electronic NEMA Premium ballast. Dimensions: 4' length, 11" width, 4" height	1	32 watt Super T8 fluorescent, 3000K	Integral electronic NEMA Premium ballast	28	ca	Prudential P222-2T8-04-WG-YGW-S-SC- VOLTS- *-NEMA PREMIUM	1. See Common Notes 8, 9, 11 below.	Legion Lighting, Cooper Metal, or approved equal
F22A	Exterior Façade at Signs	Wall cantilever mounted adjustable linear fluorescent sign light with 180 degree adjustability, 12" extension arms, extruded aluminum housing, 8' or 4' lengths to minimize brackets, painted natural textured finish, clear lens, solid out-of-visor, and integral electronic NEMA Premium ballast. Fixture must be UL Listed Wet Location. Dimensions: Continuous lengths as shown on drawings, 5" height, 12" extension arms	1	32 watt Super T8 fluorescent, 3000K	Integral electronic NEMA Premium ballast, -20 degree F start.	28	ca	Insight Lighting Arida WFS-02-12"-SSD-VOLTS-TN- WVS-NEMA PREMIUM	1. Fixture shall be continuously mounted above sign for entire length of sign and so it does not block sign. Submit symmetrical layout for approval. Minimize frequency of mounting brackets. 2. See Common Notes 8, 9, 11 below. 3. Wet location listed.	Cole SL Series, Winona Lighting, Elliptipar, or approved equal

H3	Gallery	Track mounted halogen accent light with aluminum housing, WHITE painted fixture finish, self-locking yoke, on/off safety switch, and beam softener lens. Fixture shall mounted to F1/TR1, F1/TR1A, and TR2 tracks. Dimensions: 4-1/8" diameter, 4-3/8" height	1	50 watt HIR PAR20 FLOOD	n/a	n/a	n/a	LSI 270-00-WHITE	1. Contractor shall provide a quantity of (8) H3 track heads to mount to type TR1, TR1A and TR2 when halogen lighting is required. 2. See Common Notes 5, 11 below.	LiteLab, Edison Price, or approved equal
M1	Galleries	Track mounted metal halide accent light with aluminum housing, self-locking yoke, WHITE painted fixture finish, removable cross baffle, beam softener lens, UV filter, and integral electronic ballast. Dimensions: 4-1/8" aperture, 6-9/16" width, 11-1/16" height	1	20 watt ceramic metal halide PAR20 FLOOD	Integral electronic ballast	n/a	es	LSI MHLN202-00-W-AA998-AA962	1. Fixture shall be mounted to type TR1, TR1A and TR2 track. 2. See Common Notes 5, 11 below.	See F1/ TR1 above
M2	Workshops and Pin-up Spaces	Track mounted metal halide accent light with aluminum housing, SILVER painted fixture finish, prismatic spread lens, and integral electronic ballast. Dimensions: nominal 4" aperture, 6" width, 7" height.	1	20 watt ceramic metal halide PAR20 FLOOD	Integral electronic ballast	n/a	es	JUNO TM244-20-SL-T597	1. Fixture shall be mounted to track type TR4. 2. See Common Notes 5, 11 below.	Lightolier, Halo, or approved equal
TR2	Entry Vestibule, 1st floor lobby, Galleries A and C	Surface mounted 1 circuit track with painted WHITE finish, 4' or 8' or 12' lengths, cut to lengths shown on drawings. Current limiters: 1Amp for 4' length, 2 Amp for 8' length, 3Amp for 12' length. Dimensions: Continuous lengths as shown on drawings, 1-13/16" width, 1-7/16" height.	n/a	n/a	n/a	30 (track allowance - exempt in galleries)	If	LSI 31320.* plus current limiters.	1. Fixture types M1 and H3 shall mount to track. 2. In Gallery A track shall be surface mounted to ceiling. In Gallery C track shall surface mounted to side of beam. 3. See Common Notes 5, 6, 10, 11 below.	See F1/ TR1 above
TR4	Studios and 2nd floor Pin-up Spaces	Surface mounted 1 circuit track with current limiter and SILVER painted finish, 4' or 8' lengths as shown on drawings. Current limiters: 1A for 4' length; 2A for 8' length. Dimensions: Continuous lengths as shown on drawings, 1-3/8" width, 11-1/16" height	n/a	n/a	n/a	120 (current limiter)	per track	JUNO T4 or T8-SL + TCL1SL or TCL2SL current limiters.	1. Supply electrical feed and all mounting components. 2. Fixture type M2 shall mount to track in pin-up space. 3. See Common Notes 5, 6, 10, 11 below.	Lightolier, Halo, or approved equal
X1	Exterior Façade	Wall surface-mounted UL Listed Wet Location ceramic metal halide wedge sconce with Eurocoat painted fixture finish and clear tempered glass. Provide quartz re-strike and battery backup when required for for EM usage. Dimensions: 12-5/8" length, 12-5/8" height, 8-5/8" depth.	1	35 watt ceramic metal halide T4 lamp, 3000K	Integral electronic ballast	40	es	Bega 2483P-MOD 35W MH-(QUARTZ RESTRIKE)-URO	1. Fixture shall be modified for 39 watt ceramic metal halide lamping. 2. EM: If EM shown on dwgs, fixture shall have quartz re-strike with battery backup. 3. Electrical Engineer shall coordinate EM requirements and remote inverter batteries. 4. Bottom of fixture shall be 8'-10" above grade. 5. Refer to Common Notes 8, 9, 11 below.	We-eC, Erco, or approved equal

X3	Roof doors	Wall surface mounted UL Listed Wet Location, bracket for mounting globe in vertical position, clear glass globe, screw-based socket, metal guard, natural aluminum or white painted finish as selected by Commissioner. Low Wattage label required: "20W maximum".	1	Screw-based 1200 lumen self-ballasted 20W spiral compact fluorescent, 3000K; OSI CF20EL/Mirco/8 30/ECO	Lamp with integral electronic cold weather ballast	20	ea	RAB VBR100 G - finish	1. Fixture shall be mounted so that bottom of fixture is at 6'-8" AFF or higher. 2. Integral lamp ballast shall be cold weather rated for 0 degrees F. 3. Interior wattage limit label for 20 Watts Max. 4. Owner to consider LED retrofit lamp in future when technology is suitable for enclosed fixtures. 5. If junction boxes cannot be recessed, supply RAB VXR100 G with integral J-box.	Stonco, Canlet, Abolite, or approved equal
----	------------	--	---	--	--	----	----	-----------------------	--	--

GENERAL:

- * All luminaires and luminaire components shall be UL listed for appropriate location.
- * All fluorescent and compact fluorescent lamps shall have a CRI of 80 or greater at the correlated color temperature specified unless otherwise noted.
- * All ballasts and transformers shall have a power factor of at least 0.90 unless otherwise noted.
- * Contractor shall verify mounting details with architect and order all mounting components necessary for installation of fixture at no additional cost, even if such components are not specifically called for in the contract documents.
- * Contractor shall verify all voltages with EE before placing any orders or proceeding with any work.
- * Allowances, where given, are for the cost of the luminaire and lamps to the electrical contractor only and do not include contractor markups, wiring, trenching, labor, or any other miscellaneous expenses.
- * Beam spreads are for the beam to 10% of CBCP, given in vertical degrees by horizontal degrees.
- * All luminaires and luminaire components shall be UL listed.
- * All CFL lamps shall be of the "non-amalgam" type, to ensure fastest start and highest output at start-up.
- * All fluorescent and compact fluorescent lamps shall have a CRI of 80 or greater at the correlated color temperature specified unless otherwise noted.
- * All ballasts and transformers shall have a power factor of at least 0.90 unless otherwise noted.
- * Contractor shall verify mounting details with architect and order all mounting components necessary for installation of fixture at no additional cost, even if such components are not specifically called for in the contract documents.
- * Contractor shall verify all voltages with EE before placing any orders or proceeding with any work.
- * All visible conduit, junction boxes, canopy plates, hardware, ballast containers, etc. to be painted to match adjacent surfaces. Verify all colors with Architect.
- * Submit layouts for all continuous fixtures, showing lamp lengths, breaks in housing or reflectors, and mounting and power locations.
- * EE to coordinate emergency lighting requirements. Any fluorescent luminaire designated EM shall have an integral, high-output emergency battery pack.
- * All exterior luminaires shall be Marine Grade and UL listed "Suitable for Wet Location". All foundation
- * If integral to luminaire, emergency ballast shall be factory-installed by luminaire manufacturer and not

COMMON NOTES:

1. Contractor shall provide coordinated shop drawings showing integrated work of all trades.
2. Aiming required after dark in presence of Lighting Consultant and Architect.
3. Fixture shall be ordered with necessary power supplies, drivers, power feeds and mounting hardware for installation of a complete system.
4. Locate remote transformer, drivers, and/or power supplies in a secure, concealed, accessible and well ventilated location in compliance with manufacturer's recommendations.
5. Contractor to provide all necessary lengths, feeds, connectors, supports, and other components for complete and code compliant installation.
6. Provide manufacturer's shop drawings showing all materials, finishes, run lengths (if applicable) and components for Lighting Designer and Architect review prior to fabrication.
7. Luminaire shall be ADA compliant, ie not to exceed 4" extension from wall.
8. EM battery backup pack required if EM is shown on Electrical Engineer's drawings. If integral to luminaire, emergency ballast shall be factory-installed by luminaire manufacturer and not violate warranty or UL rating. See Electrical Specifications 26500 for emergency criteria. Submit technical data sheet for each unique emergency battery/ballast, at time of shop drawings.
9. Commissioner to verify mounting height AFF.
10. Contractor to field verify run lengths prior to ordering fixtures.
11. Commissioner to verify fixture finish.

Appendix B: Lighting Control Intent Narrative

Section 26 5113 Appendix B
Lighting Controls – Design Intent Narrative

The following describes the control intent of the lighting system for the Bronx River Arts Center, as reflected in the drawings and documentation. This summary is meant to guide the contractor and the control manufacturers in providing a complete system that meets the intent of the design in every way. Please refer to the lighting layouts for HLB control zones.

Both the NYS Energy Code and ASHRAE/IESNA Std. 90.1 have mandatory requirements for lighting controls. The latter is a pre-requisite for LEED. Lights must be turned off automatically whenever spaces are unoccupied.

There is no emergency generator. Lights connected to the emergency circuit must be fitted with battery back-up packs, either integral to the luminaire or a separate unit. Lights connected to the emergency circuits should not operate for 24-hours unless absolutely required by code. Luminaires on the emergency circuit should be controlled by the designated control system. In case of loss of power all other controls must defer to the emergency lights, so they are always activated to full battery backup power when power is lost. Emergency ballasts not operating continuously shall be wired with a second hot wire in order to continuously charge the battery. In addition, the failure mode of any control system or component (photocell, timer switch, timeclock) should default to "on" in case of equipment failure, or be designed for reasonably easy override to On until repair or replacement is completed.

Multiple ganged switches and preset systems shall be permanently labeled (silkscreened or etched). Submit labeling templates to the Commissioner during the shop drawing phase.

Galleries:

Fluorescent uplights integrated in the track system will provide the ambient light for the galleries and are controlled via one dimming zone per gallery (Galleries A, B, C) so the light on the ceiling is uniform. The fluorescent lamps shall dim down to at least 5%.

Each continuous run of track, as shown on architectural drawings, shall be individually zoned as shown on drawings. Track shall not be connected to dimming controls because metal halide accent lights are the predominant light source and are not fitted with dimming ballasts.

Gallery C will also be used as a multipurpose room. For ease of operation a pre-set system with multiple zones for dimming and switching allowing up to eight pre-set scenes, including "gallery", "classroom", "movie", "party" and "cleaning", shall be used. Dual-circuit track is specified for the East end of the room, so that separate fixtures can be used for performances. All fixtures in Gallery C including the linear uplights, track lights, decorative sconces, and downlights shall be controlled by the pre-set system.

A locked central control box shall be provided on the ground floor for owner turn-on and early turn off of selected circuits, and as overrides to an automatic astronomic timeclock.

Lobbies:

Lighting in the first floor lobby shall be controlled separately from the upper floors so when there is an event on the first floor energy will not be wasted lighting the upper (vacant) floors. Occupancy sensors are required in upper elevator lobbies.

Main Stairway:

Wall-mounted linear fluorescent lights and decorative compact fluorescent sconces shall switch on/off together. The linear fluorescents are available with EM battery backup packs and should be provided as indicated on the engineering drawings.

Lease Space:

Two-lamp linear fluorescent pendants are specified as factory-wired for bi-level switching so that 1 or both lamps can be switched on depending on the amount of daylight in the room, at the choice of the occupant. All zones should be controlled by ceiling mounted ultrasonic "vacancy" sensors so that the fixtures must be switched on manually at the wall but will turn off automatically when the space is not occupied. Two-zone ultrasonic vacancy sensors will be required. Lights near the windows are controlled separately.

Offices:

Two lamp linear fluorescent pendants are specified as factory-wired for bi-level switching so that 1 or both lamps in each fixture can be switched on depending on the amount of daylight in the room, at the choice of the occupant. All zones should be controlled by ultrasonic "vacancy" sensors so that the fixtures must be switched on manually but will turn off automatically when the space is not occupied. Two-zone ultrasonic vacancy sensors will be required. Desk-top task lighting shall have a switch local to the fixture.

Hallway Pin-up Space (2nd floor):

The 4' diameter F4 fixtures are specified as factory-wired for bi-level switching allowing either 3 or 6 lamps to be switched on. The linear fluorescent fixtures (F19) and tracks (TR4) are separately zoned. This room does not have much access to daylight, but this zoning will discourage turning all the lamps on when the space is being used for circulation and not in use. A time clock shall be used to allow activation of pin-up track lights only limited during hours. Separate ceiling mounted "vacancy" sensors with manual-on switches are required for linear fixtures.

Computer Lab:

Two-lamp linear fluorescents are specified as wired for bi-level switching so that 1 or both lamps can be switched on depending on the amount of daylight in the room, for a total of 3 zones as shown. All zones should be controlled by ceiling mounted ultrasonic "vacancy" sensors so that the fixtures must be switched on manually at the wall but will turn off automatically when the space is not occupied.

Studios:

Indirect linear fluorescent pendants are zoned so that the row adjacent to the window is controlled separately from the interior row at the choice of the occupant. When daylight is present, turning the interior row of lights on can help balance out the light distribution on the ceiling. Track is on a separate zone allowing for flexibility with task lighting. All track shall have a 3 amp current limiter allowing no more than 360 watts of light to be used per track run. Ceiling-mounted vacancy sensors per future studio spaces shall required to switch all lights off when areas of the third floor are not in use, combined with momentary-contact on/off wall switches (dual-zone type, when appropriate) to control the zones shown on the drawings.

3rd Floor Egress:

The lights required for egress (as determined by the EE) shall be connected to the time clock and remain on whenever the building is occupied, with the remainder controlled by occupancy sensors.

3rd floor Lounge:

Linear fluorescents in the lounge are on a separate zone, connected to a time clock to prevent their operation during daylight hours, and vacancy sensors for evening usage.

Workshops:

The direct circular pendants in each workshop should be controlled independently by the zones shown on the drawing. The pendants shall be factory-wired for bi-level switching allowing 3 or 6 lamps to be switched on, or the fixture to remain off. Ceiling mounted vacancy sensors should keep most lights off when spaces are not occupied, requiring manual-on from local electronic switches. **Time clocks or photocells** shall prevent zone "e3", "p3", "f1", and "f5" closest to the windows from being on at full output during daylight hours. Vacancy sensors shall take over control for those two zones for evening use.

Restrooms, Storage, MEP:

All non-daylighted restrooms, storage, and MEP rooms shall have automatic on occupancy sensors so that the lights will turn on and off automatically.

Closets within offices:

For storage closets located within offices, lights shall be activated and deactivated by a physical momentary contact switch, one that activates the closet luminaire when the door is open, and turns it off when the closed door physically engages the switch.

Exterior:

Façade lighting can be turned on by a time clock at night to bring attention to the building until a curfew determined by the Owner. Signage and façade lighting should be controlled as one zone. All exterior lighting should be controlled by astronomical time clocks to prevent activation during daylight hours.

END OF SECTION 26 5113

SECTION 265600
EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Exterior luminaires with lamps and ballasts.
 - 2. Luminaire-mounted photoelectric relays.
 - 3. Poles and accessories.
 - 4. Luminaire lowering devices.
- B. Related Sections include the following:
 - 1. Division 26 Section "Interior Lighting" for exterior luminaires normally mounted on exterior surfaces of buildings.

1.3 DEFINITIONS

- A. CRI: Color-rendering index.
- B. HID: High-intensity discharge.
- C. Luminaire: Complete lighting fixture, including ballast housing if provided.

1.4 STRUCTURAL ANALYSIS CRITERIA FOR POLE SELECTION

- A. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied as stated in AASHTO LTS-4.
- B. Live Load: Single load of 500 lbf, distributed as stated in AASHTO LTS-4.
- C. Ice Load: Load of 3 lbf/sq. ft., applied as stated in AASHTO LTS-4.

- D. Wind Load: Pressure of wind on pole and luminaire, calculated and applied as stated in AASHTO LTS-4.
1. Wind speed for calculating wind load for poles 50 feet or less in height is 110 mph.

1.5 SUBMITTALS

- A. Product Data: For each luminaire, pole, and support component, arranged in order of lighting unit designation. Include data on features, accessories, finishes, and the following:
1. Physical description of luminaire, including materials, dimensions, effective projected area, and verification of indicated parameters.
 2. Details of attaching luminaires and accessories.
 3. Details of installation and construction.
 4. Luminaire materials.
 5. Photometric data based on laboratory tests of each luminaire type, complete with indicated lamps, ballasts, and accessories.
 - a. For indicated luminaires, photometric data shall be certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.
 - b. Photometric data shall be certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
 6. Photoelectric relays.
 7. Ballasts, including energy-efficiency data.
 8. Lamps, including life, output, and energy-efficiency data.
 10. Means of attaching luminaires to supports, and indication that attachment is suitable for components involved.
- B. Shop Drawings:
1. Anchor-bolt templates keyed to specific poles and certified by manufacturer.
 2. Design calculations, certified by a qualified professional engineer, indicating strength of screw foundations and soil conditions on which they are based.
 3. Wiring Diagrams: Power and control wiring.
- C. Samples for Verification: For products designated for sample submission in Exterior Lighting Device Schedule. Each sample shall include lamps and ballasts.
- D. Pole and Support Component Certificates: Signed by manufacturers of poles, certifying that products are designed for indicated load requirements in AASHTO LTS-4 and that load imposed by luminaire has been included in design.
- E. Qualification Data: For agencies providing photometric data for lighting fixtures.

- F. Field quality-control test reports.
- G. Operation and Maintenance Data: For luminaires to include in emergency, operation, and maintenance manuals.
- H. Warranty: Special warranty specified in this Section.

1.6 QUALITY ASSURANCE

- A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.
- B. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Comply with IEEE C2, "National Electrical Safety Code."
- E. Comply with NFPA 70.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace products that fail in materials or workmanship; that corrode; or that fade, stain, perforate, erode, or chalk due to effects of weather or solar radiation within specified warranty period. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, or unauthorized repairs or alterations from special warranty coverage.
 - 1. Warranty Period for Luminaires: Five years from date of Substantial Completion.
 - 2. Warranty Period for Metal Corrosion: Five years from date of Substantial Completion.
 - 3. Warranty Period for Color Retention: Five years from date of Substantial Completion.
 - 4. Warranty Period for Lamps: Replace lamps and fuses that fail within 12 months from date of Substantial Completion; furnish replacement lamps and fuses that fail within the second 12 months from date of Substantial Completion.

1.9 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Lamps: 10 for every 100 of each type and rating installed. Furnish at least one of each type.
 2. Glass and Plastic Lenses, Covers, and Other Optical Parts: 10 for every 100 of each type and rating installed. Furnish at least one of each type.
 3. Ballasts: 10 for every 100 of each type and rating installed. Furnish at least one of each type.
 4. Globes and Guards: 10 for every 20 of each type and rating installed. Furnish at least one of each type.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In Exterior Lighting Device Schedule where titles below are column or row headings that introduce lists, the following requirements apply to product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified or approved equal.

2.2 LUMINAIRES, GENERAL REQUIREMENTS

- A. Luminaires shall comply with UL 1598 and be listed and labeled for installation in wet locations by an NRTL acceptable to authorities having jurisdiction.
- B. Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.
- C. Metal Parts: Free of burrs and sharp corners and edges.
- D. Sheet Metal Components: Corrosion-resistant aluminum, unless otherwise indicated. Form and support to prevent warping and sagging.
- E. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.
- F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools.

Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses. Designed to disconnect ballast when door opens.

- G. Exposed Hardware Material: Stainless steel.
- H. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
- I. Light Shields: Metal baffles, factory installed and field adjustable, arranged to block light distribution to indicated portion of normally illuminated area or field.
- J. Reflecting surfaces shall have minimum reflectance as follows, unless otherwise indicated:
 - 1. White Surfaces: 85 percent.
 - 2. Specular Surfaces: 83 percent.
 - 3. Diffusing Specular Surfaces: 75 percent.
- K. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
- L. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.
- M. Factory-Applied Finish for Steel luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
 - 2. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
 - a. Color: As selected from manufacturer's standard catalog of colors.
 - b. Color: Match Architect's sample of custom color.
 - c. Color: As selected by Architect from manufacturer's full range.
- N. Factory-Applied Finish for Aluminum luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20; and seal aluminum surfaces with clear, hard-coat wax.
3. Class I, Clear Anodic Finish: AA-M32C22A41 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
4. Class I, Color Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.
 - a. Color: Refer to Architectural Drawings.

2.3 LUMINAIRE-MOUNTED PHOTOELECTRIC RELAYS

- A. Comply with UL 773 or UL 773A.
- B. Contact Relays: Factory mounted, single throw, designed to fail in the on position, and factory set to turn light unit on at 1.5 to 3 fc and off at 4.5 to 10 fc with 15-second minimum time delay. Relay shall have directional lens in front of photocell to prevent artificial light sources from causing false turnoff.
 1. Relay with locking-type receptacle shall comply with NEMA C136.10.
 2. Adjustable window slide for adjusting on-off set points.

2.4 FLUORESCENT BALLASTS AND LAMPS

- A. Low-Temperature Ballast Capability: Rated by its manufacturer for reliable starting and operation of indicated lamp(s) at temperatures 0 deg F and higher.
- B. Ballast Characteristics:
 1. Power Factor: 90 percent, minimum.
 2. Sound Rating: A.
 3. Total Harmonic Distortion Rating: Less than 10 percent.
 4. Electromagnetic Ballasts: Comply with ANSI C82.1, energy-saving, high power factor, Class P, automatic-reset thermal protection.
 5. Case Temperature for Compact Lamp Ballasts: 65 deg C, maximum.
 6. Transient-Voltage Protection: Comply with IEEE C62.41 Category A or better.
- C. Low-Temperature Lamp Capability: Rated for reliable starting and operation with ballast provided at temperatures 0 deg F and higher.

- D. Fluorescent Lamps: Low-mercury type. Comply with the EPA's toxicity characteristic leaching procedure test; shall yield less than 0.2 mg of mercury per liter when tested according to NEMA LL 1.

2.5 BALLASTS FOR HID LAMPS

- A. Comply with ANSI C82.4 and UL 1029 and capable of open-circuit operation without reduction of average lamp life. Include the following features, unless otherwise indicated:
1. Ballast Circuit: Constant-wattage autotransformer or regulating high-power-factor type.
 2. Minimum Starting Temperature: Minus 22 deg F.
 3. Normal Ambient Operating Temperature: 104 deg F.
 4. Ballast Fuses: One in each ungrounded power supply conductor. Voltage and current ratings as recommended by ballast manufacturer.
- B. Auxiliary, Instant-On, Quartz System: Factory-installed feature automatically switches quartz lamp on when fixture is initially energized and when momentary power outages occur. System automatically turns quartz lamp off when HID lamp reaches approximately 60 percent of light output.
- C. High-Pressure Sodium Ballasts: Electromagnetic type with solid-state igniter/starter and capable of open-circuit operation without reduction of average lamp life. Igniter/starter shall have an average life in pulsing mode of 10,000 hours at an igniter/starter-case temperature of 90 deg C.
1. Instant-Restrike Device: Integral with ballast, or solid-state potted module, factory installed within fixture and compatible with lamps, ballasts, and mogul sockets up to 150 W.
 - a. Restrike Range: 105- to 130-V ac.
 - b. Maximum Voltage: 250-V peak or 150-V ac RMS.
 2. Minimum Starting Temperature: Minus 40 deg F.

2.6 HID LAMPS

- A. High-Pressure Sodium Lamps: ANSI C78.42, CRI 21 (minimum), color temperature 1900 Insert value K, and average rated life of 24,000 hours, minimum.
1. Dual-Arc Tube Lamp: Arranged so only one of two arc tubes is lighted at one time and, when power is restored after an outage, the cooler arc tube, with lower internal pressure, lights instantly, providing an immediate 8 to 15 percent of normal light output.

- B. Metal-Halide Lamps: ANSI C78.1372, with a minimum CRI 65, and color temperature 4000 Insert value K.
- C. Pulse-Start, Metal-Halide Lamps: Minimum CRI 65, and color temperature 4000 K.
- D. Ceramic, Pulse-Start, Metal-Halide Lamps: Minimum CRI 80 and color temperature 4000 K.

PART 3 - EXECUTION

3.1 LUMINAIRE INSTALLATION

- A. Install lamps in each luminaire.
- B. Fasten luminaire to indicated structural supports.
 - 1. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.
- C. Adjust luminaires that require field adjustment or aiming.

3.2 CORROSION PREVENTION

- A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.
- B. Steel Conduits: Comply with Division 26 Section "Raceway and Boxes 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 GROUNDING

- A. Ground metal poles and support structures according to Division 26 Section "Grounding and Bonding for Electrical Systems."
 - 1. Install grounding electrode for each pole, unless otherwise indicated.
 - 2. Install grounding conductor pigtail in the base for connecting luminaire to grounding system.

B. Ground nonmetallic poles and support structures according to Division 26 Section "Grounding and Bonding for Electrical Systems."

1. Install grounding electrode for each pole.
2. Install grounding conductor and conductor protector.
3. Ground metallic components of pole accessories and foundations.

3.7 FIELD QUALITY CONTROL

A. Inspect each installed fixture for damage. Replace damaged fixtures and components.

B. Illumination Observations: Verify normal operation of lighting units after installing luminaires and energizing circuits with normal power source.

1. Verify operation of photoelectric controls.

C. Illumination Tests:

1. Measure light intensities at night. Use photometers with calibration referenced to NIST standards. Comply with the following IESNA testing guide(s):

- a. IESNA LM-5, "Photometric Measurements of Area and Sports Lighting."
- b. IESNA LM-50, "Photometric Measurements of Roadway Lighting Installations."
- c. IESNA LM-52, "Photometric Measurements of Roadway Sign Installations."
- d. IESNA LM-64, "Photometric Measurements of Parking Areas."
- e. IESNA LM-72, "Directional Positioning of Photometric Data."

D. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

3.8 DEMONSTRATION

A. Engage a factory-authorized service representative to train facility maintenance personnel to adjust, operate, and maintain luminaire lowering devices. Refer to General Conditions for minimum Demonstration and Training requirements.

END OF SECTION 265600

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 270500

COMMON WORK RESULTS FOR COMMUNICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Communications equipment coordination and installation.
2. Sleeves for pathways and cables.
3. Sleeve seals.
4. Grout.
5. Common communications installation requirements.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

- A. Product Data: For sleeve seals.

1.5 COORDINATION

- A. Coordinate arrangement, mounting, and support of communications equipment:
 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 3. To allow right of way for piping and conduit installed at required slope.

4. So connecting pathways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- C. Coordinate location of access panels and doors for communications items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping."

PART 2 - PRODUCTS

2.1 SLEEVES FOR PATHWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Sleeves for Rectangular Openings: Galvanized sheet steel.
 1. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and no side more than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
 - b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches (1270 mm) and 1 or more sides equal to, or more than, 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.2 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and pathway or cable.
 1. Manufacturers: Subject to compliance with requirements:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Pipeline Seal and Insulator, Inc.

or approved equal

3. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of pathway or cable.
4. Pressure Plates: Carbon steel. Include two for each sealing element.
5. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR COMMUNICATIONS INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both communications equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR COMMUNICATIONS PENETRATIONS

- A. Communications penetrations occur when pathways, cables, wireways, or cable trays penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
- C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
- D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
- E. Cut sleeves to length for mounting flush with both surfaces of walls.
- F. Extend sleeves installed in floors **2 inches (50 mm)** above finished floor level.
- G. Size pipe sleeves to provide **1/4-inch (6.4-mm)** annular clear space between sleeve and pathway or cable, unless indicated otherwise.
- H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
 - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
- I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and pathway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
- J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pathway and cable penetrations. Install sleeves and seal pathway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."
- K. Roof-Penetration Sleeves: Seal penetration of individual pathways and cables with flexible boot-type flashing units applied in coordination with roofing work.
- L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
- M. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between pathway or cable and sleeve for installing mechanical sleeve seals.

3.3 SLEEVE-SEAL INSTALLATION

- A. Install to seal exterior wall penetrations.
- B. Use type and number of sealing elements recommended by manufacturer for pathway or cable material and size. Position pathway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pathway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for communications installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION 270500

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 271100

COMMUNICATIONS EQUIPMENT ROOM FITTINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Telecommunications mounting elements.
2. Backboards.
3. Telecommunications equipment racks and cabinets.
4. Telecommunications service entrance pathways.
5. Grounding.

B. Related Sections:

1. Division 27 Section "Communications Horizontal Cabling" for voice and data cabling associated with system panels and devices.
2. Division 28 Section "Conductors and Cables for Electronic Safety and Security" for voice and data cabling associated with system panels and devices.

1.3 DEFINITIONS

- A. Basket Cable Tray: A fabricated structure consisting of wire mesh bottom and side rails.
- B. BICSI: Building Industry Consulting Service International.
- C. Channel Cable Tray: A fabricated structure consisting of a one-piece, ventilated-bottom or solid-bottom channel not exceeding 6 inches (152 mm) in width.
- D. Ladder Cable Tray: A fabricated structure consisting of two longitudinal side rails connected by individual transverse members (rungs).
- E. LAN: Local area network.
- F. RCDD: Registered Communications Distribution Designer.

- G. Solid-Bottom or Nonventilated Cable Tray: A fabricated structure consisting of a bottom without ventilation openings within integral or separate longitudinal side rails.
- H. Trough or Ventilated Cable Tray: A fabricated structure consisting of integral or separate longitudinal rails and a bottom having openings sufficient for the passage of air and using 75 percent or less of the plan area of the surface to support cables.

1.4 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Floor-mounted cabinets and cable pathways shall withstand the effects of earthquake motions determined according to SEI/ASCE 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]."

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for equipment racks and cabinets. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For communications equipment room fittings. 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. Equipment Racks and Cabinets: Include workspace requirements and access for cable connections.
 - 3. Grounding: Indicate location of grounding bus bar and its mounting detail showing standoff insulators and wall mounting brackets.

1.6 QUALITY ASSURANCE

- 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. Telecommunications Pathways and Spaces: Comply with TIA/EIA-569-A.
- C. Grounding: Comply with ANSI-J-STD-607-A.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install equipment frames and cable trays until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and work above ceilings is complete.

1.8 COORDINATION

- A. Coordinate layout and installation of communications equipment with City of New York, telecommunications and LAN equipment and service suppliers. Coordinate service entrance arrangement with local exchange carrier.
1. Meet jointly with telecommunications and LAN equipment suppliers, local exchange carrier representatives, and City of New York to exchange information and agree on details of equipment arrangements and installation interfaces.
 2. Record agreements reached in meetings and distribute them to other participants.
 3. Adjust arrangements and locations of distribution frames, cross-connects, and patch panels in equipment rooms to accommodate and optimize arrangement and space requirements of telephone switch and LAN equipment.
 4. Adjust arrangements 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 the equipment room.
- B. Coordinate location of power raceways and receptacles with locations of communications equipment requiring electrical power to operate.

PART 2 - PRODUCTS**2.1 PATHWAYS**

- A. General Requirements: Comply with TIA/EIA-569-A.
- B. Cable Support: NRTL labeled. Cable support brackets shall be designed to prevent degradation of cable performance and pinch points that could damage cable. Cable tie slots fasten cable ties to brackets.
1. Comply with NFPA 70 and UL 2043 for fire-resistant and low-smoke-producing characteristics.
 2. Support brackets with cable tie slots for fastening cable ties to brackets.
 3. Lacing bars, spools, J-hooks, and D-rings.
 4. Straps and other devices.
- C. Cable Trays:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. Cable Management Solutions, Inc.
 - b. Cablofil Inc.
 - c. Cooper B-Line, Inc.
 - d. Cope - Tyco/Allied Tube & Conduit.
2. Cable Tray Materials: Metal, suitable for indoors and protected against corrosion by electroplated zinc galvanizing, complying with ASTM B 633, Type 1, not less than 0.000472 inch (0.012 mm).
- D. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems.
1. Outlet boxes shall be no smaller than 2 inches (50 mm) wide, 3 inches (75 mm) high, and 2-1/2 inches (64 mm) deep.

2.2 BACKBOARDS

- A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches (19 by 1220 by 2440 mm).

2.3 EQUIPMENT FRAMES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. AMP; a Tyco International Ltd. company.
 2. Cooper B-Line, Inc.
 3. Hubbell Premise Wiring.
 4. KRONE Incorporated.
 5. Leviton Voice & Data Division.
 6. Ortronics, Inc.
 7. Panduit Corp.
 8. Siemon Co. (The).
- B. General Frame Requirements:
1. Distribution Frames: Freestanding and wall-mounting, modular-steel units designed for telecommunications terminal support and coordinated with dimensions of units to be supported.
 2. Module Dimension: Width compatible with EIA 310 standard, 19-inch (480-mm) panel mounting.
 3. Finish: Manufacturer's standard, baked-polyester powder coat.
- C. Floor-Mounted Racks: Modular-type, aluminum construction.
1. Vertical and horizontal cable management channels, top and bottom cable troughs, grounding lug, and a power strip.
 2. Baked-polyester powder coat finish.

D. Modular Freestanding Cabinets:

1. Removable and lockable side panels.
2. Hinged and lockable front and rear doors.
3. Adjustable feet for leveling.
4. Screened ventilation openings in the roof and rear door.
5. Cable access provisions in the roof and base.
6. Grounding bus bar.
7. Power strip.
8. Baked-polyester powder coat finish.
9. All cabinets keyed alike.

E. Modular Wall Cabinets:

1. Wall mounting.
2. Steel construction.
3. Treated to resist corrosion.
4. Lockable front doors.
5. Louvered side panels.
6. Cable access provisions top and bottom.
7. Grounding lug.
8. Power strip.
9. All cabinets keyed alike.

F. Cable Management for Equipment Frames:

1. Metal, with integral wire retaining fingers.
2. Baked-polyester powder coat finish.
3. Vertical cable management panels shall have front and rear channels, with covers.
4. Provide horizontal crossover cable manager at the top of each relay rack, with a minimum height of two rack units each.

2.4 POWER STRIPS

A. Power Strips: Comply with UL 1363.

1. Rack mounting.
2. Six 20-A, 120-V ac, NEMA WD 6, Configuration 5-20R receptacles.
3. LED indicator lights for power and protection status.
4. LED indicator lights for reverse polarity and open outlet ground.

2.5 GROUNDING

A. Comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems." for grounding conductors and connectors.

B. Telecommunications Main Bus Bar:

1. Connectors: Mechanical type, cast silicon bronze, solderless compression type wire terminals, and long-barrel, two-bolt connection to ground bus bar.
2. Ground Bus Bar: Copper, minimum 1/4 inch thick by 4 inches wide (6 mm thick by 100 mm wide) with 9/32-inch (7.14-mm) holes spaced 1-1/8 inches (28 mm) apart.
3. Stand-Off Insulators: Comply with UL 891 for use in switchboards, 600 V. Lexan or PVC, impulse tested at 5000 V.

C. Comply with ANSI-J-STD-607-A.

2.6 LABELING

- A. Comply with TIA/EIA-606-A and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

PART 3 - EXECUTION

3.1 ENTRANCE FACILITIES

- A. Contact telecommunications service provider and arrange for installation of demarcation point, protected entrance terminals, and a housing when so directed by service provider.
- B. Install underground pathways complying with recommendations in TIA/EIA-569-A, "Entrance Facilities" Article.

3.2 Install underground entrance pathway complying with Division 26 Section "Raceway and Boxes for Electrical Systems."INSTALLATION

- A. Comply with NECA 1.
- B. Comply with BICSI TDMM for layout and installation of communications equipment rooms.
- C. Cable Trays: Comply with NEMA VE 2 and TIA/EIA-569-A-7.
- D. Bundle, lace, and train conductors and cables to terminal points without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

3.3 FIRESTOPPING

- A. Comply with requirements in Division 07 Section "Penetration Firestopping."Comply with TIA/EIA-569-A, Annex A, "Firestopping."
- B. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.4 GROUNDING

- A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
- B. Comply with ANSI-J-STD-607-A.
- C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch (50-mm) clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.
- D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.
 - 1. Bond the shield of shielded cable to the grounding bus bar in communications rooms and spaces.

3.5 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements in Division 26 Section "Identification for Electrical Systems." Comply with requirements in Division 09 Section "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.
- B. See Division 27 Section "Communications Horizontal Cabling" for additional identification requirements. See Evaluations for discussion of TIA/EIA standard as it applies to this Section. Paint and label colors for equipment identification shall comply with TIA/EIA-606-A for Class 2 level of administration.
- C. Labels shall be preprinted or computer-printed type.

END OF SECTION 271100

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 271500
COMMUNICATIONS HORIZONTAL CABLING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section

1.2 SUMMARY

A. Section Includes:

- 1. Pathways.
- 2. UTP cabling.
- 3. Coaxial cable.
- 4. Multiuser telecommunications outlet assemblies.
- 5. Cable connecting hardware, patch panels, and cross-connects.
- 6. Telecommunications outlet/connectors.
- 7. Cabling system identification products.
- 8. Cable management system.

1.3 DEFINITIONS

- A. Basket Cable Tray: A fabricated structure consisting of wire mesh bottom and side rails.
- B. BICSI: Building Industry Consulting Service International.
- C. Channel Cable Tray: A fabricated structure consisting of a one-piece, ventilated-bottom or solid-bottom channel.
- D. Consolidation Point: A location for interconnection between horizontal cables extending from building pathways and horizontal cables extending into furniture pathways.
- E. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
- F. EMI: Electromagnetic interference.
- G. IDC: Insulation displacement connector.

- H. Ladder Cable Tray: A fabricated structure consisting of two longitudinal side rails connected by individual transverse members (rungs).
- I. LAN: Local area network.
- J. MUTOA: Multiuser telecommunications outlet assembly, a grouping in one location of several telecommunications outlet/connectors.
- K. Outlet/Connectors: A connecting device in the work area on which horizontal cable or outlet cable terminates.
- L. RCDD: Registered Communications Distribution Designer.
- M. Solid-Bottom or Nonventilated Cable Tray: A fabricated structure consisting of longitudinal side rails and a bottom without ventilation openings.
- N. Trough or Ventilated Cable Tray: A fabricated structure consisting of longitudinal side rails and a bottom having openings for the passage of air.
- O. UTP: Unshielded twisted pair.

1.4 HORIZONTAL CABLING DESCRIPTION

- A. Horizontal cable and its connecting hardware provide the means of transporting signals between the telecommunications outlet/connector and the horizontal cross-connect located in the communications equipment room. This cabling and its connecting hardware are called "permanent link," a term that is used in the testing protocols.
 - 1. TIA/EIA-568-B.1 requires that a minimum of two telecommunications outlet/connectors be installed for each work area.
 - 2. Horizontal cabling shall contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications outlet/connector.
 - 3. Bridged taps and splices shall not be installed in the horizontal cabling.
 - 4. Splitters shall not be installed as part of the optical fiber cabling.
- B. A work area is approximately 100 sq. ft. (9.3 sq. m), and includes the components that extend from the telecommunications outlet/connectors to the station equipment.
- C. The maximum allowable horizontal cable length is 295 feet (90 m). This maximum allowable length does not include an allowance for the length of 16 feet (4.9 m) to the workstation equipment. The maximum allowable length does not include an allowance for the length of 16 feet (4.9 m) in the horizontal cross-connect.

1.5 PERFORMANCE REQUIREMENTS

- A. General Performance: Horizontal cabling system shall comply with transmission standards in TIA/EIA-568-B.1, when tested according to test procedures of this standard.

1.6 SUBMITTALS

- A. Product Data: For each type of product indicated.
1. For coaxial cable, include the following installation data for each type used:
 - a. Nominal OD.
 - b. Minimum bending radius.
 - c. Maximum pulling tension.
- B. Shop Drawings:
1. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by City of New York.
 2. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.
 3. Cabling administration drawings and printouts.
 4. Wiring diagrams to show typical wiring schematics, including the following:
 - a. Cross-connects.
 - b. Patch panels.
 - c. Patch cords.
 5. Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.
 6. Cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements. Include the following:
 - a. Vertical and horizontal offsets and transitions.
 - b. Clearances for access above and to side of cable trays.
 - c. Vertical elevation of cable trays above the floor or bottom of ceiling structure.
 - d. Load calculations to show dead and live loads as not exceeding manufacturer's rating for tray and its support elements.
- C. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.
- D. Source quality-control reports.
- E. Field quality-control reports.

- D. Maintenance Data: For splices and connectors to include in maintenance manuals.
- E. Software and Firmware Operational Documentation:
 - 1. Software operating and upgrade manuals.
 - 2. Program Software Backup: On magnetic media or compact disk, complete with data files.
 - 3. Device address list.
 - 4. Printout of software application and graphic screens.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Cabling Installer must have personnel certified by manufacturer.
 - a. The contractor or subcontractor performing the work of this section must, within the last three (3) consecutive years prior to the bid opening, have successfully completed in a timely fashion at least three (3) projects similar in scope and type to the required work.
- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 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. 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. Telecommunications Pathways and Spaces: Comply with TIA/EIA-569-A.
- E. Grounding: Comply with ANSI-J-STD-607-A.
- F. The manufacturer providing the material or equipment specified in this section must, for the past five (5) years, have been regularly engaged in the manufacture of material or equipment similar in type to that required for this Project. Such similar material or equipment provided by the manufacturer must have been in satisfactory service for not less than five (5) years.

1.8 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.

1.9 COORDINATION

- A. Coordinate layout and installation of telecommunications pathways and cabling with City of New York's telecommunications and LAN equipment and service suppliers.
- B. Coordinate telecommunications outlet/connector locations with location of power receptacles at each work area.

1.10 SOFTWARE SERVICE AGREEMENT

- A. Technical Support: Beginning with Substantial Completion, provide software support for two years.
- B. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.
 - 1. Provide 30 days' notice to City of New York to allow scheduling and access to system and to allow City of New York to upgrade computer equipment if necessary.

1.11 WARRANTY

- A. Warranty for Communication Wiring: Contractor's standard form in which contractor agrees to repair or replace wiring that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period for Communication Wiring: 15 years from date of Substantial Completion.

1.12 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Patch-Panel Units: One of each type.
 - 2. Connecting Blocks: One of each type.
 - 3. Device Plates: One of each type.
 - 4. Multiuser Telecommunications Outlet Assemblies: One of each type.

PART 2 - PRODUCTS

2.1 PATHWAYS

- A. General Requirements: Comply with TIA/EIA-569-A.
- B. Cable Support: NRTL labeled for support of Category 6 cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
 - 1. Support brackets with cable tie slots for fastening cable ties to brackets.
 - 2. Lacing bars, spools, J-hooks, and D-rings.
 - 3. Straps and other devices.
- C. Cable Trays:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following, or approved equal:
 - a. Cable Management Solutions, Inc.
 - b. Cablofil Inc.
 - c. Cooper B-Line, Inc.
 - d. Cope - Tyco/Allied Tube & Conduit.
 - e. GS Metals Corp.
 - 2. Cable Tray Materials: Metal, suitable for indoors, and protected against corrosion by electroplated zinc galvanizing, complying with ASTM B 633, Type 1, not less than 0.000472 inch (0.012 mm) thick.
 - a. Channel Cable Trays: One-piece construction, nominally 4 inches (100 mm) wide. Slot spacing shall not exceed 4-1/2 inches (115 mm) o.c.
- D. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems." Flexible metal conduit shall not be used.
 - 1. Outlet boxes shall be no smaller than 2 inches (50 mm) wide, 3 inches (75 mm) high, and 2-1/2 inches (64 mm) deep.

2.2 BACKBOARDS

- A. Backboards: Plywood, fire-retardant treated, 3/4 by 48 by 96 inches (19 by 1220 by 2440 mm). Comply with requirements in Division 06 Section "Rough Carpentry" for plywood backing panels.

2.3 UTP CABLE

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. CommScope, Inc.
- B. Description: 100-ohm, 4-pair UTP, 7504-VLT plenum-rated, formed into 25-pair, binder groups covered with a violet thermoplastic jacket.
 - 1. Comply with ICEA S-90-661 for mechanical properties.
 - 2. Comply with TIA/EIA-568-B.1 for performance specifications.
 - 3. Comply with TIA/EIA-568-B.2, Category 6.
 - 4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
 - a. Communications, General Purpose: Type CM or CMG or CMP.
 - b. Communications, Plenum Rated: Type CMP or MPP, complying with NFPA 262.
 - c. Multipurpose, Plenum Rated: Type MPP, complying with NFPA 262.

2.4 UTP CABLE HARDWARE

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following, or approved equal:
 - 1. American Technology Systems Industries, Inc.
 - 2. Dynacom Corporation.
 - 3. Hubbell Premise Wiring.
 - 4. KRONE Incorporated.
 - 5. Leviton Voice & Data Division.
 - 6. Molex Premise Networks; a division of Molex, Inc.
 - 7. Nordex/CDT; a subsidiary of Cable Design Technologies.
 - 8. Panduit Corp.
 - 9. Siemon Co. (The).
 - 10. Tyco Electronics/AMP Netconnect; Tyco International Ltd.
- B. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-B.2, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.
- C. Connecting Blocks: 110-style IDC for Category 6. 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.
- E. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.

1. Number of Jacks per Field: One for each four-pair UTP cable indicated.
- F. Jacks and Jack Assemblies: Modular, color-coded, eight-position modular receptacle units with integral IDC-type terminals.
- G. Patch Cords: Factory-made, four-pair cables in 36-inch (900 mm) lengths; terminated with eight-position modular plug at each end.
 1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6 performance. Patch cords shall have latch guards to protect against snagging.
 2. Patch cords shall have color-coded boots for circuit identification.

2.5 MULTIUSER TELECOMMUNICATIONS OUTLET ASSEMBLY (MUTOA)

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following, or approved equal:
 1. Chatsworth Products, Inc.
 2. Hubbell Premise Wiring.
 3. Molex Premise Networks; a division of Molex, Inc.
 4. Nordex/CDT; a subsidiary of Cable Design Technologies.
 5. Ortronics, Inc.
 6. Panduit Corp.
 7. Siemon Co. (The).
- B. Description: MUTOAs shall meet the requirements for cable connecting hardware.
 1. Number of Terminals per Field: One for each conductor in assigned cables.
 2. Number of Connectors per Field:
 - a. One for each four-pair UTP cable indicated.
 - b. One for each four-pair conductor group of indicated cables, plus 25 percent spare positions.
 3. Mounting: Wall or Furniture.
 4. NRTL listed as complying with UL 50 and UL 1863.
 5. Label shall include maximum length of work area cords, based on TIA/EIA-568-B.1.
 6. When installed in plenums used for environmental air, NRTL listed as complying with UL 2043.

2.6 TELECOMMUNICATIONS OUTLET/CONNECTORS

- A. Jacks: 100-ohm, balanced, twisted-pair connector; four-pair, eight-position modular. Comply with TIA/EIA-568-B.1.
- B. Workstation Outlets: As indicated on drawings.
 - 1. Plastic Faceplate: High-impact plastic. Coordinate color with Division 26 Section "Wiring Devices."
 - 2. Metal Faceplate: Stainless steel, complying with requirements in Division 26 Section "Wiring Devices."
 - 3. For use with snap-in jacks accommodating any combination of UTP, optical fiber, and coaxial work area cords.
 - a. Flush mounting jacks, positioning the cord at a 45-degree angle.
 - 4. Legend: Machine printed, in the field, using adhesive-tape label.

2.7 GROUNDING

- A. Comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems" for grounding conductors and connectors.
- B. Comply with ANSI-J-STD-607-A.

2.8 IDENTIFICATION PRODUCTS

- A. Comply with TIA/EIA-606-A and UL 969 for labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
- B. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

2.9 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test UTP and optical fiber cables on reels according to TIA/EIA-568-B.1.
- C. Factory test UTP cables according to TIA/EIA-568-B.2.
- D. Factory test multimode optical fiber cables according to TIA/EIA-526-14-A and TIA/EIA-568-B.3.
- E. Factory-sweep test coaxial cables at frequencies from 5 MHz to 1 GHz. Sweep test shall test the frequency response, or attenuation over frequency, of a cable by

generating a voltage whose frequency is varied through the specified frequency range and graphing the results.

- F. Cable will be considered defective if it does not pass tests and inspections.
- G. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 ENTRANCE FACILITIES

- A. Coordinate backbone cabling with the protectors and demarcation point provided by communications service provider.

3.2 WIRING METHODS

- A. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces, in attics, and in gypsum board partitions where unenclosed wiring method may be used. Conceal raceway and cables except in unfinished spaces.
 - 1. Install plenum cable in environmental air spaces, including plenum ceilings.
 - 2. Comply with requirements for raceways and boxes specified in Division 26 Section "Raceway and Boxes for Electrical Systems."
- B. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- C. Wiring within Enclosures: Bundle, lace, and train cables to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

3.3 INSTALLATION OF PATHWAYS

- A. Cable Trays: Comply with NEMA VE 2 and TIA/EIA-569-A-7.
- B. Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.
- C. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems" for installation of conduits and wireways.
- D. Install manufactured conduit sweeps and long-radius elbows whenever possible.

E. Pathway Installation in Communications Equipment Rooms:

1. Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed, or in the corner of room where multiple sheets of plywood are installed around perimeter walls of room.
2. Install cable trays to route cables if conduits cannot be located in these positions.
3. Secure conduits to backboard when entering room from overhead.
4. Extend conduits 3 inches (76 mm) above finished floor.
5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.

G. Backboards: Install backboards with 96-inch (2440-mm) dimension vertical. Butt adjacent sheets tightly, and form smooth gap-free corners and joints.

3.4 INSTALLATION OF CABLES

A. Comply with NECA 1.

B. General Requirements for Cabling:

1. Comply with TIA/EIA-568-B.1.
2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
3. Install 110-style IDC termination hardware unless otherwise indicated.
4. MUTOA shall not be used as a cross-connect point.
5. Consolidation points may be used only for making a direct connection to telecommunications outlet/connectors:
 - 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 UTP at least 49 feet (15 m) from communications equipment room.
6. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
7. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
8. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
9. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.

10. 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.
11. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
12. In the communications equipment room, install a 10-foot- (3-m-) long service loop on each end of cable.
13. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

C. UTP Cable Installation:

1. Comply with TIA/EIA-568-B.2.
2. Do not untwist UTP cables more than 1/2 inch (12 mm) from the point of termination to maintain cable geometry.

D. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend UTP cable not in a wireway or pathway a minimum of 8 inches (200 mm) above ceilings by cable supports not more than 60 inches (1524 mm) apart.
3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

E. Installation of Cable Routed Exposed under Raised Floors:

1. Install plenum-rated cable only.
2. Install cabling after the flooring system has been installed in raised floor areas.
3. Coil cable 6 feet (1800 mm) long not less than 12 inches (300 mm) in diameter below each feed point.

F. Outdoor Coaxial Cable Installation:

1. Install outdoor connections in enclosures complying with NEMA 250, Type 4X. Install corrosion-resistant connectors with properly designed O-rings to keep out moisture.
2. Attach antenna lead-in cable to support structure at intervals not exceeding 36 inches (915 mm).

G. Group connecting hardware for cables into separate logical fields.

H. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA/EIA-569-A for separating unshielded copper voice and data 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 shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (610 mm).
3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300 mm).
4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall 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 (76 mm).
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).
5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

3.5 FIRESTOPPING

- A. Firestop all penetrations through fire rated walls and floors.
- B. Comply with TIA/EIA-569-A, Annex A, "Firestopping."
- C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.6 GROUNDING

- A. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
- B. Comply with ANSI-J-STD-607-A.
- C. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least 2-inch (50-mm) clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.
- D. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.

3.7 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification.
 - 1. Color-code cross-connect fields. Apply colors to voice and data service backboards, connections, covers, and labels.
- B. Using cable management system software specified in Part 2, develop Cabling Administration Drawings for system identification, testing, and management. Use unique, alphanumeric designation for each cable and label cable, jacks, connectors, and terminals to which it connects with same designation. At completion, cable and asset management software shall reflect as-built conditions.
- C. Comply with painting requirements for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.
- D. Cable Schedule: Post in 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.
- E. 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. Follow convention of TIA/EIA-606-A. Furnish electronic record of all drawings, in software and format selected by City of New York.
- F. Cable and Wire Identification:

1. Label each cable within 4 inches (100 mm) of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
 2. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
 3. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding 15 feet (4.5 m).
 4. 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 being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.
 - b. Label each unit and field within distribution racks and frames.
 5. 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.
 6. Uniquely identify and label work area cables extending from the MUTOA to the work area. These cables may not exceed the length stated on the MUTOA label.
- H. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA-606-A.
1. Cables use flexible vinyl or polyester that flex as cables are bent.

3.8 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
1. Visually inspect UTP and optical fiber cable 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/EIA-568-B.1.
 2. Visually confirm Category 6, marking of outlets, cover plates, outlet/connectors, and patch panels.
 3. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
 4. Test UTP backbone copper 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 shall meet or exceed applicable requirements in TIA/EIA-568-B.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 manufacturer for channel or link test configuration.
5. UTP Performance Tests:
 - a. Test for each outlet and MUTOA. Perform the following tests according to TIA/EIA-568-B.1 and TIA/EIA-568-B.2:
 - 1) Wire map.
 - 2) Length (physical vs. electrical, and length requirements).
 - 3) Insertion loss.
 - 4) Near-end crosstalk (NEXT) loss.
 - 5) Power sum near-end crosstalk (PSNEXT) loss.
 - 6) Equal-level far-end crosstalk (ELFEXT).
 - 7) Power sum equal-level far-end crosstalk (PSELFEXT).
 - 8) Return loss.
 - 9) Propagation delay.
 - 10) Delay skew.
6. Final Verification Tests: Perform verification tests for UTP systems after the complete communications cabling and workstation outlet/connectors are installed.
 - a. Voice Tests: These tests assume that dial tone service has been installed. Connect to the network interface device at the demarcation point. Go off-hook and listen and receive a dial tone. If a test number is available, make and receive a local, long distance, and digital subscription line telephone call.
 - b. Data Tests: These tests assume the Information Technology Staff has a network installed and is available to assist with testing. Connect to the network interface device at the demarcation point. Log onto the network to ensure proper connection to the network.
- D. Document data for each measurement. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.
- E. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

3.9 DEMONSTRATION

- A. Train City of New York's maintenance personnel in cable-plant management operations, including changing signal pathways for different workstations, rerouting signals in failed cables, and keeping records of cabling assignments and revisions when extending wiring to establish new workstation outlets.

END OF SECTION 271500

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 275123.50

EDUCATIONAL INTERCOMMUNICATIONS AND SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

1.2 SUMMARY

- A. Section Includes: Installation and program intercom system with the following components:
 - 1. Master stations.
 - 2. Intercom Station.
 - 3. Amplifier.
 - 4. Conductors and cables.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For educational intercommunications and program systems. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Detail equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components, and location and size of each field connection.
 - 2. Include scaled drawings for station arrangement of built-in equipment.
 - 3. Wiring Diagrams: For power, and signal wiring.
 - a. Identify terminals to facilitate installation, operation, and maintenance.
 - b. Single-line diagram showing interconnection of components.
 - c. Cabling diagram showing cable routing.
- D. Qualification Data: For qualified Installer.
- E. Field quality-control reports.
- F. Operation and Maintenance Data: For educational intercommunications and program systems to include in operation and maintenance manuals

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for location and application.
- C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Aiphone Communications, Inc.
 - 2. Lee Dan Communication

2.2 FUNCTIONAL DESCRIPTION OF MANUALLY SWITCHED SYSTEMS

- A. Master Station:
 - 1. Communicating selectively with other master and stations by actuating selector switches.
 - 2. Communicating with individual stations in privacy.
- B. Station:
 - 1. Communicating hands free.
 - 2. Being free of noise and distortion during operation and when in standby mode.

2.3 GENERAL REQUIREMENTS FOR EQUIPMENT AND MATERIALS

- A. Coordinate features and select components to form an integrated system. Match components and interconnections for optimum performance of specified functions.
- B. Expansion Capability: Increase number of stations in the future by 100 percent above those indicated without adding any internal or external components or main trunk cable conductors.
- C. Equipment: Modular type using solid-state components, fully rated for continuous duty unless otherwise indicated. Select equipment for normal operation on input power usually supplied at 110 to 130 V, 60 Hz. Comply with UL 813.

- D. Weather-Resistant Equipment: Listed and labeled by an NRTL for duty outdoors or in damp locations.

2.6 MASTER STATION

- A. Station-Selector Switches: Heavy-duty type with gold-plated contacts rated for five million operations.
- B. Tone Annunciation: Momentary audible tone signal announces incoming calls.
- C. Handset with Hook Switch: Telephone type with 18-inch- (450-mm-) long, permanently coiled cord.
- G. Central-Equipment Cabinet: Comply with TIA/EIA-310-D. Lockable, ventilated metal cabinet houses terminal strips, power supplies, amplifiers, system volume control, and auxiliary equipment.

2.9 STATIONS

- A. Mounting: Flush unless otherwise indicated, and suitable for mounting conditions indicated.
- B. Faceplate: Stainless steel or anodized aluminum with tamperproof mounting screws.
- C. Back Box: Two-gang galvanized steel with 2-1/2-inch (64-mm) minimum depth.
- D. Speaker: Minimum axial sensitivity shall be 91 dB at one meter, with 1-W input. Voice coil shall be not less than 3 inches (76 mm), 2.3 oz. (65 g) minimum; permanent magnet.
- E. Tone Annunciation: Recurring momentary tone indicates incoming calls.
- F. Call Switch: Mount on faceplate.

2.10 CONDUCTORS AND CABLES

- A. Conductors: Jacketed, twisted pair and twisted multipair, untinned solid copper. Sizes as recommended by system manufacturer, but no smaller than No. 22 AWG.
- B. Insulation: Thermoplastic, not less than 1/32 inch (0.8 mm) thick.
- C. Shielding: For speaker-microphone leads and elsewhere where recommended by manufacturer; No. 34 AWG, tinned, soft-copper strands formed into a braid or equivalent foil.

- 1. Minimum Shielding Coverage on Conductors: 60 percent.

- D. Plenum Cable: Listed and labeled for plenum installation.

PART 3 - EXECUTION

3.1 WIRING METHODS

- A. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters[, and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used.
 - 1. Install plenum cable in environmental air spaces, including plenum ceilings.
 - 2. Comply with requirements for raceways and boxes specified in Division 26 Section "Raceway and Boxes for Electrical Systems."
- B. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- C. Wiring within Enclosures: Bundle, lace, and train cables to terminal points with no excess and without exceeding manufacturer's limitations on bending radius. Provide and use lacing bars and distribution spools.

3.2 INSTALLATION OF RACEWAYS

- A. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems" for installation of conduits and wireways.
- B. Install manufactured conduit sweeps and long-radius elbows whenever possible.

3.3 INSTALLATION OF CABLES

- A. Comply with NECA 1.
- B. General Requirements:
 - 1. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at outlets and terminals.
 - 2. Splices, Taps, and Terminations: Arrange on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Cables may not be spliced.

10. SYSTIMAX Solutions; a CommScope, Inc. brand.
 11. 3M.
 12. Tyco Electronics/AMP Netconnect; Tyco International Ltd.
- B. Description: 100-ohm, 4-pair UTP, formed into 25-pair binder groups covered with a blue thermoplastic jacket.
1. Comply with ICEA S-90-661 for mechanical properties.
 2. Comply with TIA/EIA-568-B.1 for performance specifications.
 3. Comply with TIA/EIA-568-B.2, Category 6.
 4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
 - a. Communications, General Purpose: Type CM or CMG.
 - b. Communications, Plenum Rated: Type CMP, complying with NFPA 262.
 - c. Communications, Riser Rated: Type CMR, complying with UL 1666.
 - d. Communications, Limited Purpose: Type CMX.
 - e. Multipurpose: Type MP or MPG.
 - f. Multipurpose, Plenum Rated: Type MPP, complying with NFPA 262.
 - g. Multipurpose, Riser Rated: Type MPR complying with UL 1666.

2.4 UTP CABLE HARDWARE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. American Technology Systems Industries, Inc.
 2. Dynacom Corporation.
 3. Hubbell Premise Wiring.
 4. KRONE Incorporated.
 5. Leviton Voice & Data Division.
 6. Molex Premise Networks; a division of Molex, Inc.
 7. Nordex/CDT; a subsidiary of Cable Design Technologies.
 8. Panduit Corp.
 9. Siemon Co. (The).
 10. Tyco Electronics/AMP Netconnect; Tyco International Ltd.
- B. UTP Cable Connecting Hardware: IDC type, using modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of the same category or higher.
- C. Connecting Blocks: 110-style for Category 6. 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.

- 2.5 NOT USED
- 2.6 NOT USED

2.7 COAXIAL CABLE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- 1. Alpha Wire Company.
- 2. Belden CDT Inc.; Electronics Division.
- 3. Coleman Cable, Inc.
- 4. CommScope, Inc.
- 5. Draka USA.

- B. General Coaxial Cable Requirements: Broadband type, recommended by cable manufacturer specifically for broadband data transmission applications. Coaxial cable and accessories shall have 75-ohm nominal impedance with a return loss of 20 dB maximum from 7 to 806 MHz.

- C. RG-11/U: NFPA 70, Type CATV.

- 1. No. 14 AWG, solid, copper-covered steel conductor.
- 2. Gas-injected, foam-PE insulation.
- 3. Double shielded with 100 percent aluminum polyester tape and 60 percent aluminum braid.
- 4. Jacketed with sunlight-resistant, black PVC or PE.
- 5. Suitable for outdoor installations in ambient temperatures ranging from minus 40 to plus 85 deg C.

- D. RG59/U: NFPA 70, Type CATVR.

- 1. No. 20 AWG, solid, silver-plated, copper-covered steel conductor.
- 2. Gas-injected, foam-PE insulation.
- 3. Triple shielded with 100 percent aluminum polyester tape and 95 percent aluminum braid; covered by aluminum foil with grounding strip.
- 4. Color-coded PVC jacket.

- E. RG-6/U: NFPA 70, Type CATV or CM.

- 1. No. 16 AWG, solid, copper-covered steel conductor; gas-injected, foam-PE insulation.
- 2. Double shielded with 100 percent aluminum-foil shield and 60 percent aluminum braid.
- 3. Jacketed with black PVC or PE.
- 4. Suitable for indoor installations.

- F. RG59/U: NFPA 70, Type CATV.

3. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
4. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.
5. 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.
6. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used.

C. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunication spaces with terminating hardware and interconnection equipment.
2. Cable shall not be run through structural members or be in contact with pipes, ducts, or other potentially damaging items.

D. Separation of Wires: Separate low voltage wiring, and power wiring runs. Install in separate raceways or, where exposed or in same enclosure, separate conductors at least 12 inches.

3.4 INSTALLATION

- A. Match input and output impedances and signal levels at signal interfaces. Provide matching networks where required.
- B. Identification of Conductors and Cables: Color-code conductors and apply wire and cable marking tape to designate wires and cables so they identify media in coordination with system wiring diagrams.
- C. Weatherproof Equipment: For units that are mounted outdoors, in damp locations, or where exposed to weather, install consistent with requirements of weatherproof rating.
- D. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.5 GROUNDING

- A. Ground cable shields and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.
- B. Signal Ground Terminal: Locate at main equipment cabinet. Isolate from power system and equipment grounding.
- C. Install grounding electrodes as specified in Division 26 Section "Grounding and Bonding for Electrical Systems."

3.6 SYSTEM PROGRAMMING

- A. Programming: Demonstrate available programming options. Set up initial system program. Prepare a written record to include decisions, implementation methodology, and final results.

3.7 FIELD QUALITY CONTROL

- 1. Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

3.8 STARTUP SERVICE

- A. Perform startup service and initial system programming.
 - 1. Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements.
 - 2. Complete installation and startup checks according to manufacturer's written instructions.
 - 3. Test for proper operation between master station and each individual station.
 - 1. Prepare test and inspection reports.

3.9 ADJUSTING

- A. On-Site Assistance: Engage a factory-authorized service representative to provide on-site assistance in adjusting sound levels, resetting transformer taps, and adjusting controls to meet occupancy conditions.

3.10 DEMONSTRATION

- A. Train maintenance personnel to adjust, operate, and maintain the educational intercommunications and program systems.
 - 1. Train maintenance personnel on programming equipment for starting up and shutting down, troubleshooting, servicing, and maintaining the system and equipment.

END OF SECTION 275123.50

SECTION 280500

COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions.

1.2 SUMMARY

- A. Section Includes:
 - 1. Electronic safety and security equipment coordination and installation.
 - 2. Sleeves for raceways and cables.
 - 3. Sleeve seals.
 - 4. Grout.
 - 5. Common electronic safety and security installation requirements.

1.3 DEFINITIONS

- A. EPDM: Ethylene-propylene-diene terpolymer rubber.
- B. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

- A. Product Data: For sleeve seals.

1.5 COORDINATION

- A. Coordinate arrangement, mounting, and support of electronic safety and security equipment:
 - 1. To allow maximum possible headroom unless specific mounting heights that reduce headroom are indicated.
 - 2. To provide for ease of disconnecting the equipment with minimum interference to other installations.
 - 3. To allow right of way for piping and conduit installed at required slope.

4. So connecting raceways, cables, wireways, cable trays, and busways will be clear of obstructions and of the working and access space of other equipment.
- B. Coordinate installation of required supporting devices and set sleeves in cast-in-place concrete, masonry walls, and other structural components as they are constructed.
- C. Coordinate location of access panels and doors for electronic safety and security items that are behind finished surfaces or otherwise concealed. Access doors and panels are specified in Division 08 Section "Access Doors and Frames."
- D. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping".

PART 2 - PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

- A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
- B. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- C. Sleeves for Rectangular Openings: Galvanized sheet steel.
 1. Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than 50 inches (1270 mm) and no side more than 16 inches (400 mm), thickness shall be 0.052 inch (1.3 mm).
 - b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches (1270 mm) and 1 or more sides equal to, or more than, 16 inches (400 mm), thickness shall be 0.138 inch (3.5 mm).

2.2 SLEEVE SEALS

- A. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 1. Manufacturers: Subject to compliance with requirements:
 - a. Advance Products & Systems, Inc.
 - b. Calpico, Inc.
 - c. Metraflex Co.
 - d. Pipeline Seal and Insulator, Inc.

3. Sealing Elements: EPDM interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
4. Pressure Plates: Carbon steel Include two for each sealing element.
5. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.3 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRONIC SAFETY AND SECURITY INSTALLATION

- A. Comply with NECA 1.
- B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
- C. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
- D. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electronic safety and security equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
- E. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRONIC SAFETY AND SECURITY PENETRATIONS

- A. Electronic safety and security penetrations occur when raceways, pathways, cables, wireways, or cable trays penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

- B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
 - C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
 - D. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
 - E. Cut sleeves to length for mounting flush with both surfaces of walls.
 - F. Extend sleeves installed in floors 2 inches (50 mm) above finished floor level.
 - G. Size pipe sleeves to provide 1/4-inch (6.4-mm) annular clear space between sleeve and raceway or cable, unless indicated otherwise.
 - H. Seal space outside of sleeves with grout for penetrations of concrete and masonry
 - 1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
 - I. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants."
 - J. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping."
 - K. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
 - L. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 - M. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.
- 3.3 SLEEVE-SEAL INSTALLATION
- A. Install to seal exterior wall penetrations.
 - B. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble

mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

3.4 FIRESTOPPING

- A. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electronic safety and security installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping."

END OF SECTION 280500

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 280513

CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. UTP cabling.
 - 3. Coaxial cabling.
 - 4. RS-232 cabling.
 - 5. RS-485 cabling.
 - 6. Low-voltage control cabling.
 - 7. Control-circuit conductors.
 - 8. Fire alarm wire and cable.
 - 9. Identification products.

1.3 DEFINITIONS

- A. Basket Cable Tray: A fabricated structure consisting of wire mesh bottom and side rails.
- B. BICSI: Building Industry Consulting Service International.
- C. Channel Cable Tray: A fabricated structure consisting of a one-piece, ventilated-bottom or solid-bottom channel section.
- D. EMI: Electromagnetic interference.
- E. IDC: Insulation displacement connector.
- F. Ladder Cable Tray: A fabricated structure consisting of two longitudinal side rails connected by individual transverse members (rungs).
- G. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.

- H. Open Cabling: Passing telecommunications cabling through open space (e.g., between the studs of a wall cavity).
- I. RCDD: Registered Communications Distribution Designer.
- J. Solid-Bottom or Nonventilated Cable Tray: A fabricated structure consisting of integral or separate longitudinal side rails, and a bottom without ventilation openings.
- K. Trough or Ventilated Cable Tray: A fabricated structure consisting of integral or separate longitudinal rails and a bottom having openings sufficient for the passage of air and using 75 percent or less of the plan area of the surface to support cables.
- L. UTP: Unshielded twisted pair.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
 - 1. For coaxial cable, include the following installation data for each type used:
 - a. Nominal OD.
 - b. Minimum bending radius.
 - c. Maximum pulling tension.
- B. Shop Drawings: Cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements. Include the following:
 - 1. Vertical and horizontal offsets and transitions.
 - 2. Clearances for access above and to side of cable trays.
 - 3. Vertical elevation of cable trays above the floor or bottom of ceiling structure.
 - 4. Load calculations to show dead and live loads as not exceeding manufacturer's rating for tray and its support elements.
- C. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.
- D. Source quality-control reports.
- E. Field quality-control reports.
- F. Maintenance Data: For wire and cable to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An NRTL.
 - 1. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing.
 - B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 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. 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.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Test cables upon receipt at Project site.
 - 1. Test each pair of UTP cable for open and short circuits.
- 1.7 PROJECT CONDITIONS
- A. Environmental Limitations: Do not deliver or install UTP and coaxial 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.

PART 2 - PRODUCTS

2.1 PATHWAYS

- A. Support of Open Cabling: NRTL labeled for support of Category 6 cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
 - 1. Support brackets with cable tie slots for fastening cable ties to brackets.
 - 2. Lacing bars, spools, J-hooks, and D-rings.
 - 3. Straps and other devices.
- B. Cable Trays:
 - 1. Manufacturers: Subject to compliance with requirements or approved equal:

- a. Cable Management Solutions, Inc.
 - b. Cablofil Inc.
 - c. Cooper B-Line, Inc.
 - d. Cope - Tyco/Allied Tube & Conduit.
 - e. GS Metals Corp.
 2. Cable Tray Materials: Metal, suitable for indoors, and protected against corrosion by electroplated zinc galvanizing, complying with ASTM B 633, Type 1, not less than 0.000472 inch (0.012 mm) thick.
 - a. Basket Cable Trays: 6 inches (150 mm) wide and 2 inches (50 mm) deep. Wire mesh spacing shall not exceed 2 by 4 inches (50 by 100 mm).
 - b. Trough Cable Trays: Nominally 6 inches (150 mm) wide.
 - c. Ladder Cable Trays: Nominally 18 inches (455 mm) wide, and a rung spacing of 12 inches (305 mm).
 - d. Channel Cable Trays: One-piece construction, nominally 4 inches (100 mm) wide. Slot spacing shall not exceed 4-1/2 inches (115 mm) o.c.
 - e. Solid-Bottom Cable Trays: One-piece construction, nominally 12 inches (305 mm) wide. Provide without solid covers.
- C. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems."
1. Outlet boxes shall be no smaller than 2 inches (50 mm) wide, 3 inches (75 mm) high, and 2-1/2 inches (64 mm) deep.
- 2.2 BACKBOARDS
- A. Backboards: Plywood fire-retardant treated 3/4 by 48 by 96 inches (19 by 1220 by 2440 mm). Comply with requirements for plywood backing panels in Division 06 Section "Rough Carpentry".
- 2.3 UTP CABLE
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Belden CDT Inc.; Electronics Division.
 2. Berk-Tek; a Nexans company.
 3. CommScope, Inc.
 4. Draka USA.
 5. Genesis Cable Products; Honeywell International, Inc.
 6. KRONE Incorporated.
 7. Mohawk; a division of Belden CDT.
 8. Nordex/CDT; a subsidiary of Cable Design Technologies.
 9. Superior Essex Inc.

1. No. 20 AWG, solid, copper-covered steel conductor; gas-injected, foam-PE insulation.
 2. Double shielded with 100 percent aluminum polyester tape and 40 percent aluminum braid.
 3. PVC jacket.
- G. RG59/U (Plenum Rated): NFPA 70, Type CMP.
1. No. 20 AWG, solid, copper-covered steel conductor; foam fluorinated ethylene propylene insulation.
 2. Double shielded with 100 percent aluminum-foil shield and 65 percent aluminum braid.
 3. Copolymer jacket.
- H. NFPA and UL compliance, listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 1655, and with NFPA 70 "Radio and Television Equipment" and "Community Antenna Television and Radio Distribution" Articles. Types are as follows:
1. CATV Cable: Type CATV.
 2. CATV Plenum Rated: Type CATVP, complying with NFPA 262.
 3. CATV Riser Rated: Type CATVR, complying with UL 1666.
 4. CATV Limited Rating: Type CATVX.

2.8 COAXIAL CABLE HARDWARE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Aim Electronics; a brand of Emerson Electric Co.
 2. Leviton Voice & Data Division.
 3. Siemon Co. (The).
- B. Coaxial-Cable Connectors: Type BNC, 75 ohms.

2.9 RS-232 CABLE

- A. Standard Cable: NFPA 70, Type CM.
1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
 2. Polypropylene insulation.
 3. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
 4. PVC jacket.
 5. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.

6. Flame Resistance: Comply with UL 1581.

B. Plenum-Rated Cable: NFPA 70, Type CMP.

1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. Plastic insulation.
3. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
4. Plastic jacket.
5. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
6. Flame Resistance: Comply with NFPA 262.

2.10 RS-485 CABLE

A. Standard Cable: NFPA 70, Type CM.

1. Paired, 2 pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with UL 1581.

B. Plenum-Rated Cable: NFPA 70, Type CMP.

1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. Fluorinated ethylene propylene insulation.
3. Unshielded.
4. Fluorinated ethylene propylene jacket.
5. Flame Resistance: NFPA 262, Flame Test.

2.11 LOW-VOLTAGE CONTROL CABLE

A. Paired Lock Cable: NFPA 70, Type CMG.

1. 1 pair, twisted, No. 16 AWG, stranded (19x29) tinned copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with UL 1581.

B. Plenum-Rated, Paired Lock Cable: NFPA 70, Type CMP.

1. 1 pair, twisted, No. 16 AWG, stranded (19x29) tinned copper conductors.
2. PVC insulation.
3. Unshielded.

4. PVC jacket.
 5. Flame Resistance: Comply with NFPA 262.
- C. Paired Lock Cable: NFPA 70, Type CMG.
1. 1 pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors.
 2. PVC insulation.
 3. Unshielded.
 4. PVC jacket.
 5. Flame Resistance: Comply with UL 1581.
- D. Plenum-Rated, Paired Lock Cable: NFPA 70, Type CMP.
1. 1 pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors.
 2. Fluorinated ethylene propylene insulation.
 3. Unshielded.
 4. Plastic jacket.
 5. Flame Resistance: NFPA 262, Flame Test.

2.12 CONTROL-CIRCUIT CONDUCTORS

- A. Class 1 Control Circuits: Stranded copper, Type THHN-THWN, in raceway complying with UL 83.
- B. Class 2 Control Circuits: Stranded copper, Type THHN-THWN, in raceway complying with UL 83.
- C. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type TW or TF, complying with UL 83.

2.13 FIRE ALARM WIRE AND CABLE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Comtran Corp.
 2. Draka USA.
 3. Genesis Cable Products; Honeywell International, Inc.
 4. Rockbestos-Suprenant Cable Corporation.
 5. West Penn Wire/CDT; a division of Cable Design Technologies.
- B. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.

12/21/2012

- C. Signaling Line Circuits: Twisted, shielded pair, not less than No. 18 AWG.
 - 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 2-hour rating.
- D. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.
 - 1. Low-Voltage Circuits: No. 16 AWG, minimum.
 - 2. Line-Voltage Circuits: No. 12 AWG, minimum.
 - 3. Multiconductor Armored Cable: NFPA 70, Type MC, copper conductors, Type TFN/THHN conductor insulation, copper drain wire, copper armor with outer jacket] with red identifier stripe, NTRL listed for fire alarm and cable tray installation, plenum rated, and complying with requirements in UL 2196 for a 2-hour rating.

2.14 IDENTIFICATION PRODUCTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Brady Corporation
 - 2. HellermannTyton.
 - 3. Kroy LLC.
 - 4. Panduit Corp.
- B. Comply with UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
- C. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

2.15 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate cables.
- B. Factory test UTP and optical fiber cables on reels according to TIA/EIA-568-B.1.
- C. Factory test UTP cables according to TIA/EIA-568-B.2.
- D. Factory test multimode optical fiber cables according to TIA/EIA-526-14-A and TIA/EIA-568-B.3.
- E. Factory sweep test coaxial cables at frequencies from 5 MHz to 1 GHz. Sweep test shall test the frequency response, or attenuation over frequency, of a cable by

generating a voltage whose frequency is varied through the specified frequency range and graphing the results.

- F. Cable will be considered defective if it does not pass tests and inspections.
- G. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 INSTALLATION OF PATHWAYS

- A. Cable Trays: Comply with NEMA VE 2 and TIA/EIA-569-A-7.
- B. Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.
- C. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems." for installation of conduits and wireways.
- D. Install manufactured conduit sweeps and long-radius elbows whenever possible.
- E. Pathway Installation in Equipment Rooms:
 - 1. Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed or in the corner of room where multiple sheets of plywood are installed around perimeter walls of room.
 - 2. Install cable trays to route cables if conduits cannot be located in these positions.
 - 3. Secure conduits to backboard when entering room from overhead.
 - 4. Extend conduits 3 inches above finished floor.
 - 5. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.
- F. Backboards: Install backboards with 96-inch dimension vertical. Butt adjacent sheets tightly, and form smooth gap-free corners and joints.

3.2 INSTALLATION OF CONDUCTORS AND CABLES

- A. Comply with NECA 1.
- B. General Requirements for Cabling:
 - 1. Comply with TIA/EIA-568-B.1.
 - 2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
 - 3. Install 110-style IDC termination hardware unless otherwise indicated.

4. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
5. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches (760 mm) and not more than 6 inches (150 mm) from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
6. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
7. 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.
8. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
9. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

C. UTP Cable Installation:

1. Comply with TIA/EIA-568-B.2.
2. Do not untwist UTP cables more than 1/2 inch (12 mm) from the point of termination to maintain cable geometry.

D. Optical Fiber Cable Installation:

1. Comply with TIA/EIA-568-B.3.
2. Cable shall be terminated on connecting hardware that is rack or cabinet mounted.

E. Open-Cable Installation:

1. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
2. Suspend copper cable not in a wireway or pathway a minimum of 8 inches (200 mm) above ceilings by cable supports not more than 60 inches (1525 mm) apart.
3. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.

F. Installation of Cable Routed Exposed under Raised Floors:

1. Install plenum-rated cable only.
2. Install cabling after the flooring system has been installed in raised floor areas.
3. Coil cable [72 inches (1830 mm)] long shall be neatly coiled not less than 12 inches (300 mm) in diameter below each feed point.

G. Outdoor Coaxial Cable Installation:

1. Install outdoor connections in enclosures complying with NEMA 250, Type 4X. Install corrosion-resistant connectors with properly designed O-rings to keep out moisture.
2. Attach antenna lead-in cable to support structure at intervals not exceeding 36 inches (915 mm).

H. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA/EIA-569-A recommendations for separating unshielded copper voice and data 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 shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches (127 mm).
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches (300 mm).
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches (600 mm).
3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches (64 mm).
 - b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches (150 mm).
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches (300 mm).
4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall 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 (75 mm).
 - c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).
5. Separation between Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
6. Separation between Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).

3.3 FIRE ALARM WIRING INSTALLATION

- A. Comply with NECA 1 and NFPA 72.
- B. Wiring Method: Install wiring in metal raceway according to Division 26 Section "Raceway and Boxes for Electrical Systems."
 - 1. Install plenum cable in environmental air spaces, including plenum ceilings.
 - 2. Fire alarm circuits and equipment control wiring associated with the fire alarm system shall be installed in a dedicated raceway system. This system shall not be used for any other wire or cable.
- C. Wiring Method:
 - 1. Cables and raceways used for fire alarm circuits, and equipment control wiring associated with the fire alarm system, may not contain any other wire or cable.
- D. 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 the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.
- E. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.
- F. 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.
- G. 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 the receipt or transmission of signals from other floors or zones.
- H. Wiring to Remote Alarm Transmitting Device: 1-inch (25-mm) 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.

3.4 CONTROL-CIRCUIT CONDUCTORS

- A. Minimum Conductor Sizes:

1. Class 1 remote-control and signal circuits, No. 14 AWG.
2. Class 2 low-energy, remote-control and signal circuits, No. 16 AWG.
3. Class 3 low-energy, remote-control, alarm and signal circuits, No. 12 AWG.

3.5 CONNECTIONS

- A. Comply with requirements in Division 28 Section "Perimeter Security Systems" for connecting, terminating, and identifying wires and cables.
- B. Comply with requirements in Division 28 Section "Intrusion Detection" for connecting, terminating, and identifying wires and cables.
- C. Comply with requirements in Division 28 Section "Access Control" for connecting, terminating, and identifying wires and cables.
- D. Comply with requirements in Division 28 Section "Video Surveillance" for connecting, terminating, and identifying wires and cables.
- E. Comply with requirements in Division 28 Section "PLC Electronic Detention Monitoring and Control Systems" for connecting, terminating, and identifying wires and cables.
- F. Comply with requirements in Division 28 Section "Fire Detection and Alarm" for connecting, terminating, and identifying wires and cables.
- G. Comply with requirements in Division 28 Section "Refrigerant Detection and Alarm" for connecting, terminating, and identifying wires and cables.

3.6 FIRESTOPPING

- A. Comply with requirements in Division 07 Section "Penetration Firestopping."
- B. Comply with TIA/EIA-569-A, "Firestopping" Annex A.
- C. Comply with BICSI TDMM, "Firestopping Systems" Article.

3.7 GROUNDING

- A. For communications wiring, comply with ANSI-J-STD-607-A and with BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
- B. For low-voltage wiring and cabling, comply with requirements in Division 26 Section "Grounding and Bonding for Electrical Systems."

3.8 IDENTIFICATION

- A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.9 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
 - 1. Visually inspect UTP and optical fiber cable jacket materials for UL or third-party certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA/EIA-568-B.1.
 - 2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
 - 3. Test UTP 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 shall meet or exceed applicable requirements in TIA/EIA-568-B.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 manufacturer for channel or link test configuration.
 - 4. Coaxial Cable Tests: Comply with requirements in Division 27 Section "Master Antenna Television System."
- D. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.
- E. End-to-end cabling will be considered defective if it does not pass tests and inspections.
- F. Prepare test and inspection reports.

END OF SECTION

SECTION 281600
INTRUSION DETECTION

Part 1 General

1.1 SECTION INCLUDES

- A. Control panel.
- B. Detection Accessories.
- C. Communications.
- D. Environmental monitoring.

1.2 REFERENCE STANDARDS

- A. Codes and standards referenced in this section refer to the latest edition thereof.
- B. Electronic Industries Association (EIA)
 - 1. REC 12749, Power Supplies.
 - 2. RS 16051, Sound Systems.
- C. National Fire Protection Association (NFPA)
 - 1. NFPA 70, Article 517, National Electric Code.
 - 2. NFPA 101, Life Safety Code.
- D. Underwriters Laboratories of Canada (ULC)
 - 1. CAN/ULC-S302, Installation and Classification of Burglar Alarm Systems for Financial and Commercial Premises, Safes and Vaults.
 - 2. CAN/ULC-S303, Local Burglar Alarm Units and Systems.
 - 3. CAN/ULC-S304, Intrusion Detection.
 - 4. CAN/ULC-S306, Intrusion Detection Units.
 - 5. ULC-S318, Power Supplies for Burglar Alarm Systems.
 - 6. ORD-C634, Connectors and Switches for Use with Burglar Alarm Systems.
- E. Underwriters' Laboratories (UL)
 - 1. UL 603, Standard for Power Supplies For Use With Burglar-Alarm Systems.
 - 2. UL 639, Standard for Intrusion-Detection Units.

1.3 DEFINITIONS

- A. EAC: Electronic Access Control System.
- B. PIR: Passive Infrared Detectors.

1.4 DESIGN PERFORMANCE REQUIREMENTS

- A. Design intrusion detection system using ULC/UL Listed Alarm Service Company.
- B. Design system as a modular access control, alarm monitoring system expandable, and easily modified for inputs, outputs and remote control stations.
 - 1. Design components in accordance with CAN/ULC-S306 and be capable of:
 - a. Annunciating undesirable, abnormal or dangerous condition.
 - b. Prioritizing alarms by alarm type; i.e. panic/duress, intrusion and tamper.
 - c. Determining zone where alarm occurred.
 - d. Annunciating power failure and power restoration.
 - e. Annunciating low battery condition.
 - f. Operate continuously for minimum period of 4 hours in the event of a power failure.
- C. Equip control panels with continuous tamper detection on door and wall.
 - 1. Tamper detection to trigger alarm and trouble light.
- D. Design system with:
 - 1. Alarm masking.
 - 2. Remote maintenance or diagnostics with password activation and call back modem.
 - 3. Unique identifier for each authorized person.
 - 4. Arming and disarming capabilities: manual and automatic by time of day, day of week, or by operator command.
 - 5. Support both manual and automatic responses to alarms entering system.
 - 6. Each alarm capable of initiating different functions of camera, homing, and activation of remote devices, audio switching, door control and card or pin validation.
 - 7. Zone or alarm location annunciated at monitoring station.
- E. Communications link: security level of I as described in CAN/ULC-S304.
- F. Signal link: Security level of I as described in CAN/ULC-S304.
- G. Alarm condition: Design system to provide maximum time for an alarm to be communicated of 60 seconds from alarm initiation to annunciation at remote monitoring location.
- H. Junction boxes: tamper proof with continuous tamper-detection capability.

- I. Design system power supplies rated to provide cumulative load of all systems components plus safety factor of 50% or greater.

1.5 SUBMITTALS

- A. Product Data: Submit manufacturer's printed product literature, specifications and datasheet.
 - 1. Submit two copies of WHMIS MSDS - Material Safety Data Sheets.
 - 2. Submit manufacture's literature for each control panel and detection accessory device.
 - 3. Submit:
 - a. Functional description of equipment.
 - b. Technical data for all devices.
 - c. Device location plans and cable lists.
 - d. Devices mounting location detail drawings.
 - e. Typical devices connection detail drawings
- B. Submit shop drawings to indicate project layout, mounting heights and locations, wiring diagrams, detection device coverage patterns and contact operating gaps.
- C. Submit zone layout drawing indicating number and location of zones and areas covered.
- D. Submit one sample of each control panel and detection device accessory. Reviewed and accepted control panel, detection device accessory will be returned for incorporation into work.
- E. Test Reports: Submit certified test reports from approved independent testing laboratories indicating compliance with specifications for specified performance characteristics and physical properties.
- F. Certificates: Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
 - 1. Submit UL Product Safety Certificates.
 - 2. Submit verification Certificate that service company is ULC/UL List alarm service company.
 - 3. Submit verification Certificate that intrusion alarm system is Certified Alarm System.
- G. Instructions: Submit manufacturer's installation instructions.
- H. Manufacturer's Field Services: Submit copies of manufacturer's field reports.
- I. Maintenance Data: Submit maintenance data.
 - 1. Include:

- a. System configuration and equipment physical layout.
- b. Functional description of equipment.
- c. Instructions of operation of equipment.
- d. Illustrations and diagrams to supplement procedures.
- e. Operation instructions provided by manufacturer.
- f. Cleaning instructions.

1.6 WARRANTY

- A. Manufacturer's Warranty: Submit, for Commissioner acceptance, manufacturer's warranty document executed by authorized company official, stating that the Intrusion Detection system is warranted against defects in operation, material and workmanship for a period of 12 months from date of substantial completion of the project.

1.7 SUPPORT SERVICES

- A. Provide manufacturer/dealer advice, information and support services for 1 year.

1.8 TRAINING

- A. Arrange and pay for on-site lectures and demonstrations by system manufacturer to train operational personnel in the use and maintenance of the system.

PART 2 PRODUCTS

2.1 MANUFACTURER'S

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified;
 - a. TYCO Fire And Security
 - b. Honeywell Security
 - c. GE Security

2.2 MATERIALS

- A. Control Panel: ULC approved, expandable and designed for multiplexed expansion.
 1. Zones (protection inputs): 32.
 2. Fixed Zones: 8.
 3. Expandable: 8 - 64 zones.
 4. Number of user codes required: 10.
 5. Number of Areas/Partitions required: 10.
 6. Keypads: LCD (liquid crystal display).

12/21/2012

7. Alarm: Monitored.
 8. System: Wired.
 9. Integrated with sub systems.
 10. Number of programmable outputs required: 5.
 11. System supervision: telephone line, battery, and AC power.
 12. Siren output.
 13. Number of devices per zone: as required.
- B. Detection Accessories:
1. Passive Infrared Detectors (PIR's): ULC approved, digital.
 - a. Coverage pattern: as required/indicated.
 - b. Temperature requirement: as required/indicated.
 - c. Tamper switch.
 - d. Mounting: wall or ceiling.
 2. Glassbreak Detector: ULC approved, complete with tamperproof switch and be designed to meet temperature and mounting requirements of project.
 - a. Coverage pattern: as required/indicated.
 3. Dual Passive Infrared and Microwave: ULC approved, complete with tamperproof switch, and be designed to meet temperature and mounting requirements of project.
 - a. Coverage pattern: as required/indicated
 4. Contacts: ULC approved.
 - a. Mounting: surface.
 - b. Mounting locations: door window or overhead door.
 - c. Operating gap: 9.5 mm.
 - d. Security level: high security
 - e. Type: magnetic biased.
 5. Vibration or Shock Sensors: as required.
 6. Photo Electric Beams: as required.
 7. Notification Devices:
 - a. Siren: 15 watt.
 - b. Speaker complete with driver voice annunciator.
- C. Communications: telephone line Digital Dialer.
- D. Environmental Monitoring: Design system for detection of Smoke/Heat, Temperature Humidity and Flood.
- E. Connectors and switches: to ORD-C634.
- F. Power supplies: to ULC-S318 or UL 603.

G. Design was based on the following equipment:

1. Security control panel (TYCO-STAR0016W-64) – or approved equal
2. USB Control Panel (TYCO-ADACSNET) – or approved equal
3. Advanced Power System (TYCO-AS0063-00) – or approved equal
4. Intellex Digital Video (TYCO-ADD6R0DVD050 with & NAV 19RTC LCD MONITOR) – or approved equal
5. Standard Proximity Card Reader (TYCO – SWH5100 HID COMPATIBLE SWH PROXIMITY READER (GRAY)) – or approved equal
6. Card Reader at vestibule (TYCO – RM2L-PH LCD DISPLAY KEYPAD PROXIMITY READER ARMING AND DISARMING ALARM ZONES IN BRANCH) – or approved equal
7. Siren with strobe lights (BENTEL SECURITY-WAVE/WSB) or approved equal
8. Thermal Sensor (BY TRAF SYS or equal)
9. Security Camera (SAMSUNG-SCC131B or equal (520 TV LINES MINIMUM RESOLUTION, 30 FRAMES/SEC)) or approved equal
10. APC rackmountable smart UPS 1500 VA (SUA1500RM2U) – or approved equal
11. UPS network management card with environmental monitoring probe (AP9619) – or approved equal
12. Ceiling camera (TYCO – ADSDU822WION) – or approved equal
13. Magnetic door contact (SENTROL 2706AS OR EQUAL)
14. Panic button (SENTROL 3040, ADEMCO, GE Electric or approved equal)
15. Keypads: LCD (liquid crystal display), or approved equal.
16. Voice data ultra media cable (750VLT(Cat 6e Plenum Rated violet) – or approved equal.
17. Video Balun combiner for twisted pair (NITEK VB43ATF) or approved equal.

PART 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

- A. Compliance: Comply with manufacturer's written data, including product technical bulletins, product catalog installation instructions, product carton installation instructions, and datasheet.

3.2 WIRING AND RACEWAY

A. ☐ GENERAL

Installations in new buildings and modernization projects shall be exposed in cable tray above the suspended ceilings.

- ☐☐ 1. The Contractor shall provide all wiring for the Intrusion Alarm System to make all items completely operational. Where wiring is installed in raceway, Contractor shall provide a full complement of junction/splice boxes.
- ☐ ☐ 2. All wiring installations for intrusion alarm shall comply with Art. 35 "Signal Systems" of the NYC Electrical Code. Power branch circuit wiring shall be provided with over current protection as called for in the Code.
- ☐ ☐ 3. All terminations of wiring in panels shall be made with insulated spade lugs.
- ☐ ☐ 4. Wiring inside all panels shall be labeled, routed neatly and tied with cable straps.
- ☐☐ 5. Round fiber tags marked in black ink shall be tied around wiring inside zone expander, control panel, to indicate function and connection point.

☐☐ B. TYPES OF WIRING

- ☐ Wiring from control to detectors shall be unshielded #16 AWG, copper, vinyl insulated, twisted pair and UL listed. All other system wiring shall be #16 AWG conductors except where indicated on drawings. Power wiring shall be in accordance with other sections of this specification. All wiring shall be imprinted by the manufacturer with the manufacturer's name, type of insulation, wire gage, UL listing, etc.

☐☐ C. INTERWIRING

- ☐ ☐ 1. Provide wiring from transformers to the respective connection points on the control panel, and all other equipment required.
- ☐ ☐ 2. Provide wiring from detector to specified zone of control panel.
- ☐ ☐ 3. Provide wiring from magnetic contact switches and/or roll-up door contacts to specified zone of control panel.
- ☐ ☐ 4. Provide wiring from Alphanumeric Consoles to the control panel.
- ☐☐ 5. Provide wiring between panic switches and control panel.

☐ GROUNDING

All alarm equipment shall be properly grounded according to manufacturer's instructions. Contractor shall furnish and install a continuous #10 copper conductor in raceway properly grounded to the cold water service pipe at the building ground bus bar. Secure the conductor with an approved grounding clamp.

☐

☐

3.3 INSTALLATION

- A. Install panels, intrusion detection system and components in accordance with manufacturer's written installation instructions to locations, heights and surfaces shown on reviewed shop drawings.
- B. Install panels, intrusion detection system and components secure to walls, ceilings or other substrates.
- C. Install required boxes in inconspicuous accessible locations.
- D. Conceal conduit and wiring.

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Services:
 - 1. Have manufacturer of products, supplied under this Section, review Work involved in the handling, installation/application, protection and cleaning, of its products and submit written reports, in acceptable format, to verify compliance of Work with Contract.
 - 2. Manufacturer's Field Services: Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.
 - 3. Schedule site visits, to review Work, at stages listed:
 - a. After delivery and storage of products, and when preparatory Work, or other Work, on which the Work of this Section depends, is complete but before installation begins.
 - b. During progress of Work at 25% and 60% complete.
 - c. Commissioning of the Work.
 - 4. Obtain reports, within 3 days of review, and submit, immediately, to Consultant.

3.5 VERIFICATION AND COMMISSIONING

- A. Perform verification inspections and test in the presence of Commissioner.
 - 1. Provide all necessary tools, ladders and equipment.

2. Ensure appropriate subcontractors, and manufacturer's representatives and security specialists are present for verification.
- B. Visual verification: Objective is to assess quality of installation and assembly and overall appearance to ensure compliance with Contract Documents. Visual inspection to include:
1. Sturdiness of equipment fastening.
 2. Non-existence of installation related damages.
 3. Compliance of device locations with reviewed shop drawings.
 4. Compatibility of equipment installation with physical environment.
 5. Inclusion of all accessories.
 6. Device and cabling identification.
 7. Application and location of ULC approval decals.
- C. Technical verification: Purpose to ensure that all systems and devices are properly installed and free of defects and damage. Technical verification includes:
1. Measurements of coverage patterns
 2. Connecting joints and equipment fastening.
 3. Compliance with manufacturer's specification, product literature and installation instructions.
- D. Operational verification: Purpose to ensure that devices and systems' performance meet or exceed established functional requirements. Operational verification includes:
1. Operation of each device individually and within its environment.
 2. Operation of each device in relation with programmable schedule and or/specific functions.

3.6 CLEANING AND ADJUSTING

- A. Remove protective coverings from control panels, detection accessories and components.
- B. Adjust all components for correct function.

END OF SECTION 281600

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 283111

DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. The Work shall include all labor, equipment, materials and necessary services to provide a complete addressable multiplex fire alarm system. The system shall be an Addressable Fire Alarm Signaling System with devices individually annunciated on the Fire Alarm Control Panel and the printer. Evacuation alarm shall be temporal 3 coded. The system shall have supervised wiring with all operations as herein described. The system shall consist of, but not be limited to, the following:

1. Fire alarm control panel(s) with English text annunciator/printer.
2. Manual pull stations.
3. Area smoke detectors.
4. Duct smoke detectors.
5. Sprinkler waterflow switch alarm, for each flow switch.
6. Audible Annunciators (Horns).
7. Visual Annunciators (Strobes).
8. Air handling systems shutdown controls.
9. Sprinkler valve tamper switch supervision.
10. Fuse cutout in electric room.
11. Battery Backup.

1.2 APPLICABLE LISTINGS, CODES AND STANDARDS

- A. All equipment shall be UL listed for its intended use.
- B. All wiring shall be installed as per Chapter 4000-06 of the NYC Building Code and in raceways as described in section 260533.
- C. NFPA (National Fire Protection Association) Standards 72.

- D. NFPA Standard 13, when used with sprinkler systems.
- E. The New York City Building Code.
- F. The New York City Materials and Equipment Acceptance (MEA) Division.
- G. The New York City Fire Department Rules & Regulations.

1.3 RELATED WORK

- A. The Contractor shall coordinate the work in this Section with all related trades. Work and/or equipment provided in other Sections and related to the fire alarm system shall include, but not be limited to:
 - 1. Sprinkler water flow and tamper switches shall be provided by the Mechanical trade. See Division 21.
They shall be wired and connected to the Fire Alarm System by this Contractor.
 - 2. Air handling systems fan and damper control circuits shall be furnished by the air handling system's control equipment. See Division 23.
Interconnecting wiring to the Fire Alarm System shall be provided by this Contractor.

1.4 SYSTEM DESCRIPTION

- A. The system shall perform as described below. All equipment, components, and labor required shall be provided by the Contractor.
- B. Fire Detection
 - 1. Fire detection shall be accomplished by:
 - a. Operation of a manual pull station.
 - b. Water flow in the Sprinkler System.
 - c. Operation of Smoke Detectors in the HVAC ductwork.
 - d. Operation of Area Type Smoke Detector.
- C. Alarm Indication
 - 1. Operation of a pull station shall immediately alarm the building audibly via the sounding an evacuation code to ring a coded temporal 3 signal for four rounds then automatically stop ringing and visibly with the flashing of synchronized strobe type indicating lights.

12/21/2012

The visual lights however shall continue to flash until a reset button on the Fire Alarm Control Panel is pushed, or automatically reset after five minutes, whichever comes first.

2. Activation of waterflow in the sprinkler system shall sound four rounds of temporal 3 signal and shall indicate active device on fire alarm control panel.
3. Activation of any smoke detector sound four rounds of temporal 3 signal and shall indicate active device on fire alarm control.

D. Miscellaneous Operations

1. Operation of any automatic fire detection device shall shut down all fans controlled by smoke detectors, all fire/smoke dampers and purge dampers and release magnetic door holders.
2. Operation of the sprinkler water flow switch, the fire alarm control panel shall also activate the elevator recall system.
3. Operation of any fire detection device shall be recorded individually at the printer, the control panel, and it shall be indicated at the remote annunciator.

E. Keyboard Display Module Operation/Indications

1. An alarm may be acknowledged by actuating the "ALARM/TROUBLE ACKNOWLEDGE" key/button. This shall silence the keyboard audible device, and change the "SYSTEM ALARM" LED from flashing to steadily lit. If multiple alarm conditions are present, they shall scroll and continue to flash and pulse the system audible device until all alarms are acknowledged.
2. Failure of normal power, open or short circuits, disarrangement in system wiring, failure of microprocessor, failure of any addressable module or any ground fault condition shall activate the system trouble circuitry. Amber "SYSTEM TROUBLE" LED shall illuminate when any of these conditions exist. Along with the trouble LED, a steady trouble audible signal shall be sounded and a flashing 40-character alphanumeric error message shall be displayed.
3. All trouble conditions and error messages shall be indicated on the system alphanumeric printer, including the time and date of each occurrence.
4. A trouble signal may be acknowledged by actuating the "ALARM/TROUBLE ACKNOWLEDGE" key/button. This shall silence the trouble audible signal and change the display from flashing to steady. If multiple trouble conditions are present, the LED shall stay lit and the audible signal will sound until all troubles are acknowledged.

5. During an "alarm" condition, all "trouble" signals shall be suppressed with the exception of illumination of the "SYSTEM TROUBLE" LED.

1.5 QUALITY ASSURANCE

A. Equipment/System

1. All equipment furnished under these Specifications shall be UL listed and be MEA approved for its intended purpose.
2. The system shall be listed in the UL Fire Protection Equipment Directory under product category "Control Units System (UOJZ)".

B. Manufacturer

1. The manufacturer shall have been engaged in the production of this type of equipment for at least three (3) years and shall have to have a fully equipped service organization within fifty (50) miles of the installation.

C. Distributor

1. The company providing the material and supervision shall be a factory authorized distributor for the material to be provided.
2. The distributor shall be located within 50 miles of the project.
3. The distributor shall provide a fully factory trained and authorized repair and service organization capable of providing on-site supervision throughout the project, and warranty/maintenance service after acceptance.
4. The distributor shall provide all technical support required for an operational system. All service technicians shall be NICET Level 2 certified, factory certified, and possess a Fire Department Certificate of Fitness per Rule 6 of the Fire Prevention Code.
5. The distributor shall provide all engineering support required to provide professional supervision and installation support. The distributor shall have at least one engineering staff member who is NICET certified, factory certified, and possess a Fire Department Certificate of Fitness per the Fire Prevention Code.

D. Company Field Advisor

Secure the services of a Company Field Advisor for a minimum of 16 working hours

for the following:

1. Render advice regarding the installation and final adjustment of the system.
2. Render advice on the suitability of each signal-initiating device for its particular application.
3. Witness final system tests and then certify with an affidavit that the system is installed in accordance with the Contract Documents and is operating properly.
4. Train facility personnel in operation, programming, and routine maintenance of the system (minimum of 4 hours).
5. Explain available service programs to facility supervisory personnel for their consideration.

1.6 SUBMITTALS

A. Prior to start of this Work, the Contractor shall submit the following material for review by the Authority's Representative.

1. Provide a list (bill of materials) of all equipment and components to be used in the system.
2. Provide description of operation of the system, to include any and all exceptions, variances or substitutions. Include a copy of printer headings, reports, prompts, etc.
3. Provide system Ampere load (during both normal and alarm conditions) and time calculations to substantiate compliance (battery Ampere-Hour capacity) with battery back up power requirements.
4. Provide manufacturer's printed product data, catalog pages and descriptions of any special installation procedures. Include a full listing of all MEA Approval Numbers on all products and components.

Data from the Company producing the system, proving that:

- a. Fire detection devices that receive their power from the initiating circuit of a fire alarm control unit are listed for use with the control unit.
- b. The system is UL listed and approved for use in New York City.
- c. The batteries proposed for use are compatible with the battery charger.

5. Provide Shop Drawings as follows:
 - a. Large scale drawing, including actual dimensions, of the fire alarm control panel(s) (FACP), and all ancillary equipment.
 - b. Riser diagram showing all equipment and types, all connections and number and size of all conductors.
6. Provide a schedule, for review and approval, of the proposed label for each auxiliary control switch at the fire alarm control panel.
7. Provide a schedule, for review and approval of the proposed label for each auxiliary control switch and color for each LED/Lamp indicator for the Smoke Purge Panel.
8. Provide a schedule, for review and approval, of the proposed label and color for each LED/lamp indicator at the remote annunciator.
9. Provide samples of equipment as requested.
10. Certificate of compliance with the Quality Assurance and Maintenance requirements.
11. Warranty.
12. Videotape of the personnel training.
13. Operation and Maintenance Manuals, including Riser diagram in a frame with glass cover.
14. Computer program, including manufacturers' codes and instructions.
15. Bureau of Fire Prevention of the New York City Fire Department certificate of approval.
16. Test results and certificate of completion of testing.

1.7 MAINTENANCE

A. Service Availability

A fully equipped service organization capable of guaranteeing response time within 8 hours to service call shall be available 24 hours a day, 7 days a week to service the complete Work.

1.8 WARRANTY

12/21/2012

- A. Special Warranty: Written warranty, executed by manufacturer agreeing to repair or replace materials or workmanship for a period of one (1) year from the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. The following manufacturers are approved for the furnishing of the specified items of Fire Detection and Signaling Equipment: EST, Edwards, Faraday, Fire Control Instruments, Notifier, Pyrotronics/Siemens, Simplex and Wheelock or approved equal. Each item of equipment offered by these manufacturers must meet the full requirements of the Specification for that item.

2.2 APPROVALS

- A. The Contractor shall obtain and file Form A-433, "Application for Electrical Inspection and Summary of Contract Equipment to be Installed," with the Bureau of Fire Prevention.

The Contractor shall then accompany the Fire Department inspector during his inspection of the system, make all adjustments required by the inspector and re-file for additional inspections until a non-conditional approval is received from the Fire Department.

- B. The fire signal system as installed shall be approved by the Bureau of Fire Prevention of the New York City Fire Department. A certificate of approval shall be obtained by the Contractor and delivered to the Authority as a prerequisite for final acceptance.

2.3 EQUIPMENT

- A. General

- 1. The following equipment where shown on the Drawings or called for in the Specifications shall be furnished and installed by the Contractor at locations where shown on the Drawings or directed.

- B. Manual Fire Signal Pull Station.

- 1. Provide an addressable manual fire signal pull station at each location indicated on the Drawings or called for in the Specifications.
 - 2. Each pull station shall be addressable manual pull lever double action type requiring the opening of a door before an operating lever becomes available. The pull stations shall have push button type actuating mechanism.

3. Each pull station shall have hinged inner and outer doors with the inner door locked. A common key shall be required to gain access for resetting the station. Instructions for operating station shall appear on front of the outer door.
4. The pull station shall be interfaced into the addressable system by means of an addressable interface module. One module shall be provided for each pull station of the manual pull station. Separately mounted addressable modules are not acceptable.
5. The mechanism shall be set into a separate cast metal box for surface mounting, and shall be set in a stamped steel box for semi-flush mounting. All parts shall have a baked enamel red finish and exposed edges shall be rounded.
6. Pull stations shall be set so that the centerline of the operating lever of station shall be 4 feet above finished floor. The Contractor shall report to the Authority's Representative any interference with wainscot, or other construction or mechanical equipment.
7. Pull station shall be Simplex Cat #RMS-1T, Faraday Cat. #PM 6696, or Aames Security Cat. #RMS 1T-LPKL with Notifier MMX-101 monitor module or approved equal.
8. False Fire Alarm Stopper Cover: Provide false fire alarm stopper cover to fit every pull station shown on the drawings. False fire alarm stopper shall be Safety Technology International Stopper II P/N – STI 1100 with 9 volts dc battery.

C. Audible Annunciators (Horns)

1. The Contractor shall provide Horns wherever the Drawings require.
2. Each Horn shall be installed on a standard 4" galvanized electrical box, either flush or surface mounted, as indicated on Drawings. Provide weatherproof box and gasket in damp, wet or exterior locations.
3. Horns shall be electrically polarized and include a blocking network to allow for connection to a supervised fire alarm signal circuit.
4. Each Horn shall have a UL reverberant, dB (A), high volume setting, 24 VDC, between 82 and 91 dB(A) at 10'-0". Each Horn shall have adjustable Hi-Lo dB setting.
5. Where indicated on Drawings Horns shall come equipped with a strobe unit that mounts directly to basic Horn mechanism.

12/21/2012

- a. The strobe section and Horn section shall be separate and can be connected to either separate signal circuit loops or to the same signal circuit loop.
 - b. Strobe unit shall be front mounted and visible from all sides of the lens.
 - c. Horns shall be 24VDC.
6. Horns and Combination Horn/Strobe units shall be by single supplier. Horns shall be EST model 757-1A-T and Horns/strobe unit shall be EST or approved equal.

D. Visual Annunciators (Strobes)

1. The rating of the strobe unit shall be a minimum of 15/75 candela and shall deliver all characteristics and requirements called for in Local Law 58 of 1987, the American With Disabilities Act (ADA), including the "Equivalent Facilitation" rule, and UL 1971. In corridors and places of assembly and common areas, the strobes shall be synchronized.
2. Visual Annunciators (Strobes) shall be wall-mounted 24 volt DC with a high intensity strobe device.
3. Fixture assembly shall be mounted on a painted steel plate. A translucent dome of hi-impact plastic, with the work "Fire" silk-screened red in 1/2" high letters, shall be provided to provide readability from both sides of the unit.
4. The dome shall be screw fastened or epoxied to plate so as to prevent dome from being removed.
5. Strobes and wiring shall be 100% supervised by the Fire Signal System Control Panel.
6. In new construction, the indicator shall be mounted to a flush 2-gang outlet box with suitably placed threaded holes to accept mounting of the indicator plate. In existing construction, surface mounted boxes shall be a finished cast type box with no knockouts, Type FS or FD. Strobes installed in damp, wet or exterior locations shall be provided with a weatherproof box and gasket.
7. Strobes shall be EST model 202-7A or 405-7A or Wheelock # RSS-241575W-FR or approved equal.
8. All strobes shall be synchronized within the line of sight.

E. Area Type Smoke Detectors

1. The Contractor shall provide intelligent analog addressable photoelectric smoke detectors with bases at locations shown on the Drawings or called for in the Specifications. Analog addressable ionization smoke detectors shall be provided for the elevator lobby.
2. Smoke detectors shall operate on 24V D.C. received from the Fire Signal Control panel. Smoke detectors shall be analog type supervised by that panel for sensitivity rating within acceptable thresholds. Deviations shall be annunciated at the control panel & remote locations.
3. Where area smoke detectors are located on ceilings of corridors, stair landings, or vestibules, the Contractor shall provide an approved guard around each smoke detector. This guard shall be separately mounted to the ceiling with at least four mounting points, and shall be UL crosslisted for use with the smoke detector.
4. All smoke detectors shall be supplied with an L.E.D. Indicator lamp which shall give indication that the smoke detector is active (flash) and latch (on steady) when the detector has tripped into alarm.
5. Area type photoelectric smoke detector shall be EST model SIGA-PS or Notifier SDX-551. Elevator lobby ionization type smoke detector shall be EST model SIGA-IS or approved equal of the manufacturers listed in Article 2.01A.

G. Duct Smoke Detectors

1. The Contractor shall provide intelligent addressable photoelectric duct type smoke detectors at locations shown on the Drawings or called for in the Specifications.
2. Duct detectors shall be designed for mounting on the outside of ducts with two air sampling tubes extending into the air stream within the duct.
3. Duct detectors shall be provided complete with outlet box, photoelectric detector chamber, sampling tubes, sensitivity control.
4. Ducts detectors shall be analog type and operate on 24 volts D.C. received from a fire alarm control panel and shall be 100% supervised by that panel.
5. The Contractor shall arrange for the sheet metal trades to drill holes in the ductwork for mounting the smoke detectors and its sampling tubes. That trade shall perform the actual mounting of these items on and within the ductwork.

6. All sampling tubes shall be sized to fit the interior dimensions of the ductwork being penetrated and in a manner that meets the manufacturer's criterion for an acceptable and working arrangement.
7. The Contractor shall consult the HVAC Drawings for the exact locations and duct size of all duct detectors.
8. In areas where the ducts are very small in interior dimensions (e.g. 12"-36") smoke detectors must be installed on and within those ducts. The detector shall be UL listed for this application.
9. All duct type smoke detectors shall be provided with a remote L.E.D. indicator lamp, at readily visible location, which shall give a local indication that the detector has been activated.
10. Duct detector shall be Notifier SDX-551 with DHX-501 housing, EST SIGA-DH with SIGA -PS or approved equal.

H. Alarm Interface Modules

1. Alarm interface Modules shall interface normally open contacts of water flow, tamper and other supervisory devices to the addressable system.
2. Each Interface Module shall provide selector switches to set an individual address to identify the module to the fire alarm control panel. These switches shall be field adjustable. Interface Modules that require an external programmer or prom burner shall not be acceptable.
3. Alarm Interface module shall be EST model SIGA-CT1 (single input) or SIGA-CT2 (double input) or approved equal.

I. Control Relay Interface Module

1. Control Relay Interface Modules shall interface auxiliary and mechanical equipment such as door holders, smoke hatches, smoke dampers and fan shut down control points to the addressable system.
2. Each Interface Module shall provide selector switches to set an individual address to identify the module to the fire alarm control panel. These switches shall be field adjustable. Interface Modules that require an external programmer or prom burner shall not be acceptable.

J. Alphanumeric Printer

1. A dot matrix alphanumeric printer shall be provided capable of printing the appropriate addressable device number and customized location message for any active device.

2. Any device status message shall be printed with date and time of occurrence.
3. The Contractor shall provide a printed list of the addresses for all stations indicating locations of fire signal boxes with respect to exits, stairs (not column numbers) or adjacent room numbers. Included in this list shall also be addresses for the operation of the sprinkler alarm, (water flow switch) & all smoke detectors.

This list shall be mounted on the wall of the Custodian's office, where directed, behind a transparent non-breakable; non-inflammable plastic face set in aluminum frame. Submit list for approval before installation.

4. Printer shall be Notifier PRN-4, EST PTIS or approved equal.

K. Alarm Bells

1. The Contractor shall provide a suitable 10" alarm bells adjacent to the Fire Alarm Control Panel. Each bell shall have a distinctive unique sound so that it can be identifiable from all other bells when it sounds.
2. Alarm Bell shall be EST model 439D-10AW or approved equal.

L. Trouble Bells

1. The Contractor shall provide a trouble bell adjacent to the Fire Alarm Control Panel and where indicated on the plans.
2. Each trouble bell shall be 6" in size and shall indicate trouble on the system.
3. Trouble bell shall be EST model 439D-6AW or approved equal.

M. Silencer Switch and Pilot Light for Trouble Bells

1. The Contractor shall provide a combination silencer switch and pilot light wherever a trouble bell is provided.
2. This switch shall be in connection with the trouble bell of the fire signal board. The switch and pilot light shall be placed behind a stainless steel plate type 302 engraved "SILENCER". The switch positions shall be engraved "T. BELL" and "LIGHT". Lettering shall be colored with red enamel. Silencer switch shall be connected in such a manner that the act of silencing the trouble bell, by the operation of the silencer switch, automatically transfers the trouble signal to the pilot light on the control board.
3. When the trouble has been repaired, the trouble bell shall ring until the silencing switch has been reset to its normal position.

4. At the Contractor's option, the silencer switch for the trouble bell located above the panel may be incorporated into the panel.

N. Sprinkler Alarm Bell

1. The Contractor shall furnish and install a 10" water flow alarm bell on the exterior of the building where shown on the Drawings or where directed.
2. This bell shall be a weather resistant type designed for exterior mounting and painted red.
3. Bell shall be mounted at the height as required by the Building Code of the City of New York. The Contractor shall furnish and install a plaque beneath this bell inscribed as directed by the Building Code of the City of New York.
4. Exterior Water Flow Alarm Bell shall be EST model 439D-10AW or Notifier KMS1024 or approved equal.

2.4 CONTROL PANELS

A. Fire Alarm Control Panel

1. Fire Alarm Control Panel shall be EST model EST2 350PTS / EST3 > 350 pts or Notifier NFC-640, FCI FV7200 series or approved equal.

B. System Power Supply

1. The system power supply shall operate on 120 VAC main power, this power shall be transformer converted to low voltage providing rectified and filtered 24 VDC for system operation. This 24 VDC shall be rated @ 4 Amps and shall comply with U.L. Standard 864 for power limited and "brown-out" operation.
2. The power supply shall provide power for all system and auxiliary control functions, including the charging of the back-up stand-by batteries.
3. The charger output shall be supervised and fused.
4. The battery charger shall be capable of charging either sealed lead-acid or vented nickel-cadmium (Ni-Cad) batteries.
5. The batteries shall be sized to provide 24 hours of standby operation in the supervision mode, with 15 minutes of alarm capacity at the end of 24 hours.
6. System power supply shall be Notifier PS12250 or approved equal.

C. Microcontroller Module:

1. The microcontroller module shall contain the microprocessor, memory, system operating software, configuration memory and the circuits necessary to support the fire control system.
2. The microcontroller module shall function as the system's information and control center, processing all messages from the field devices (supervisory, trouble, alarm).
3. Microprocessor Functions:
 - a. The microprocessor shall execute all supervisory programming to detect and report the failure or disconnection of any module or peripheral device. An isolated circuit shall be incorporated, which will monitor the microprocessor, if a failure were to occur, this circuitry would provide audible and visual indication of this abnormal condition.
 - b. The microprocessor shall access the system program for all control-by-event (CBE) functions. No system memory shall be lost due to failure of the primary and secondary power. Volatile memory shall not be acceptable.
 - c. All job specific system programming, as to device monitoring and control functions, shall be field programmable.
4. Real-Time Clock:
 - a. The micro-controller module shall have a real-time clock capable of monitoring all real-time programming and all time control functions.

D. Keyboard Display Module

1. These keyboard display modules shall provide display, annunciation and control for the complete Fire Alarm Control System.
2. An alphanumeric, true English, display shall be an integral part of the keyboard display module. This display shall be back lighted for ease of reading in the dark or bright light conditions.
3. The keyboard shall provide keypad permitting selection of system functions. Also incorporated with the keypad shall be three (3) control keys: ALARM/TROUBLE ACKNOWLEDGE, RESET/LAMP TEST, and ALARM SILENCE.

E. Notification Appliance Circuit Module

1. Provide a Notification Appliance Circuit Module in the Fire Alarm Control Panel to supervise the audible and visual circuit wiring for open, grounds and shorts. Field located modules shall be housed as Transponders. The use of Control Modules for signal circuits will not be accepted. There shall be a minimum of 2 strobe circuits and 2 Horn circuits, wired interleaved, per floor as required by NY City Code.

F. Coder Module

1. The coder module shall be solid state located at the Fire Alarm Control Panel. The coder shall be 100% field programmable for all codes from 1-1-1 to 15-15-15-15. The module shall provide a minimum of 256 codes. Each addressable device that must generate a code will be assigned a code on the coder module. All signals shall be PNIS as required by NFPA.

G. Addressable Loop Module

1. An addressable loop module shall be provided for communications with all addressable devices (initiation/control) connected to the system.
2. Each addressable loop module shall contain one loop, capable of communicating with a minimum of 192 addressable devices. Each system shall be capable of monitoring multiple loop modules. Provide a minimum of 25% spare capacity.
3. Communication loops shall be capable of being wired either Class "A" (Style 6), a ground fault on either conductor or a break shall not prevent a device from operating on either side of the break or Class "B" (Style 4), a break or ground fault in any conductor shall be reported as a trouble condition.
4. Each communication loop shall be electrically supervised for opens, shorts, and ground fault conditions.
5. The system shall be equipped with a minimum capacity of 198 addressable smoke detectors, 198 addressable control modules and additional capacities for full point annunciation without decreasing the aforementioned capacities.

H. Smoke Purge Control Panel

1. A smoke purge control panel shall be provided at the main entrance of the building, adjacent to the FACP (located on the Drawings). Access to this system shall be via New York City Fireman Lock Only. The smoke purge panel may be incorporated into the fire alarm control panel, if approved by the Fire Department, and if the panel is suitably located.

2. Smoke purge control panel shall include the following equipment:
 - a. A LED display shall be provided to allow Fire Department complete status and control of smoke exhaust fans and all the motorized purge dampers in the building.
 - b. Control switches and status indicators shall be provided for smoke purge fan and motorized purge dampers.
 - c. Motorized purge dampers shall be zoned as one zone per floor and shall be so indicated on the purge control panel.
 - d. Motorized dampers in fire rescue area shall be displayed as one zone at the smoke purge control panel.
 - e. A separate lamp test switch shall be provided.
 - f. Modules for the elevator recall control shall be Notifier # CMX-2, MMX-1 and MR-201 or approved equal of the manufacturers listed in Article 2.01A.
3. Control switches and status indicators shall provide Fire Department with the capability of turning on/off smoke purge fan individually and open/close of each motorized purge damper zone.

2.5 FIRE SIGNAL CUTOOUT PANEL (FUSE CUTOOUT PANEL)

- A. The Contractor shall provide an individual cartridge fuse cutout with 3 poles, and a removable solid neutral bar in fuse gap for each fire control system indicated on Drawings.
- B. Compartments shall be provided for each fuse cutout with partitions between each fuse cutout.
- C. Fuse Cutouts shall be provided with silver sand fuses, current limiting type with an interrupting capacity rating of 200,000 amps (RMS symmetrical). The size of the fuse shall be as required by the connected load and the protection of wiring connected to the fuse.
- D. Each cutout shall bear a white-core bakelite identification nameplate.
- E. A feeder shall be provided tapped off the main building service (or other connection as shown on the plans) ahead of the main service switch but after the Current Transformers (Metering Transformers).
- F. The circuits for the Fire Alarm Systems shall be as follows:

1. One (1) circuit for fire alarm panel.
 2. One (1) circuit for printer.
- G. The complete assembly shall meet N.Y.C. Electrical & Fire code requirements.
- H. Fuse cutout box shall be Notifier # FCO or approved equal.

2.6 MARKERS AND RISER

A. Markers

Premarked self-adhesive; W.H. Brady Co.'s B940, Thomas and Betts Co.'s E-Z Code WSL self-laminating, Ideal Industries' Mylar/Cloth wire markers, or Markwick Corp.'s permanent wire markers.

B. Riser

Contractor shall provide a readable riser diagram in a frame with glass cover. Riser shall be mounted where indicated by the Authority's Representative and properly secured to the wall. All Fire Alarm devices shall be clearly indicated on riser diagram.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The entire system shall be installed in a workmanlike manner, in accordance with approved manufacturers' wiring diagram. The Contractor shall provide all conduit, wiring, outlet boxes, junction boxes, cabinet's and similar devices necessary for the complete installation.

- B. All penetrations of floor slabs and fire walls shall be fire stopped in accordance with all local fire codes.

- C. End of Line Devices (Resistors/Diodes/Capacitors).

Shall be provided as required for mounting as directed by the manufacturer.

- D. All wiring shall be color coded throughout, to New York City Electrical Code standards and a minimum of No. 14 AWG. unless otherwise noted. All wiring shall be of the type recommended by the manufacturer, approved by the Fire Department.

The Fire Alarm Cable, which shall include Data, Addressable Loop, and signalling wire 8ft. above the finished floor, shall meet the following requirements:

1. A minimum temperature rating of 150°C
 2. A minimum average insulation thickness of 15 mils
 3. A minimum average jacket thickness of 25 mils
 4. The color of the cable shall be red
 5. The cable shall be a type FPLP (plenum type)
 6. The cable shall be visibly marked externally that it meets the above requirements and is listed by UL.
- E. Circuits from the fire alarm control panel to the system peripheral equipment shall be a minimum of as follows:
1. Each alarm initiating or supervisory circuit: Two (2) No. 14 AWG conductors
 2. Each alarm signaling/indicating circuit: Two (2) No. 12 AWG conductors.
 3. Each control circuit: Two (2) No. 14 AWG conductors.
- F. Identification, Labeling, Marking
1. Procedure Sign: Install adjacent to FACP and remote annunciator.
 2. Zone Locator: Install adjacent to FACP and remote annunciator.
 3. Power-Limited Circuits: Mark circuits at terminations, indicating that circuit is a power-limited fire protective signaling circuit.
 4. Labeling Circuit Disconnects: Label the device used as the circuit disconnecting means for the dedicated branch circuits serving the system "FIRE ALARM CIRCUIT CONTROL."
 5. Identification of Circuits: Identify wires and cables in interconnection cabinets, and FACP with premarked, self-adhesive, wraparound type markers. Designations shall correspond with point to point wiring diagrams.
 6. Battery Data: Insert a copy of the battery warranty in each battery compartment and mark on batteries the date placed in service.
 7. Fire alarm system terminal and junction locations shall be identified in accordance with NFPA Standard 70, Section 760-3. Terminal and junction boxes shall be painted red.
- G. The system shall be arranged to receive power from 120 volt, 60-cycle alternating current supply through a fuse cutout. All low voltage operation shall be provided from the fire alarm control panel(s).

- H. All final connections shall be made under the supervision of a trained manufacturer's technical representative.
- I. Do not install smoke detector until the Work (including cleaning) of all trades in the area has been completed. Protect installed smoke detectors from airborne dust and debris with covers provided by the manufacturer for this purpose.
- J. The Contractor shall arrange for the sheet metal trades to drill holes in the ductwork for mounting the smoke detectors and its sampling tubes. That trade shall perform the actual mounting of these items on and within the ductwork. The duct detectors shall be wired and connected to the Fire Alarm System by the Electrical contractor.
- K. Guards
 - 1. Attach guards directly to the surface with vandal resistant fasteners.
 - 2. Where detectors are installed on suspended ceiling provide additional supports in the ceiling, such as channel support system, angel iron or additional runner bars. Fasten the additional supports rigidly to the ceiling runner bar system. Attach frame of resistant fasteners. Install metal spacers between the vandal guard frame and the supports so that the ceiling tiles will not be a part of the support system.
 - 3. Use finishing collar between ceiling and vandal guard where vandal guard cannot be mounted tight against ceiling due to job conditions.
- L. Grounding
 - 1. A dedicated # 10 ground wire shall be installed in conduit from the water main ground bus of the building and attached to the frame of the Fire alarm control panel. Ground connection at water pipe shall be by means of Thomas and Betts 3670 line, Appleton, Crouse-Hinds or other approved ground fitting.

3.2 TESTS

- A. Prior to the final acceptance test, the Contractor and a trained manufacturer's technical representative shall test the completed system for proper operation in the presence of the Authority. The entire system shall be demonstrated to perform all of the functions as below listed in these Specifications. Any system, equipment device or wiring failure discovered during said test shall be repaired or replaced before requesting scheduling of the final acceptance test. All repairs shall be retested in the presence of the Authority prior to the final acceptance test.
- B. The Contractor shall File A-433 (Application for Electrical Inspection and Summary of Contract Equipment to be installed) with the Bureau of Fire Prevention of the Fire Department. He shall do this in preparation for the final tests of the system.

- C. Upon completion of above, the Contractor shall perform final acceptance in the presence of the Authority's Representative, NYPL personnel, the Inspector from the Bureau of Fire Prevention, Contractor's representative and the Manufacturer's representative. Notify the Authority at least 3 working days prior to the test so arrangements can be made to have a facility representative witness the test.
- D. During the tests indicated above and during the final acceptance test:
1. Every manual fire alarm station shall be tested.
 2. Every smoke detector shall be tested.
 3. The sprinkler system waterflow alarm switches shall be tested by flowing water. The sprinkler system valve tamper switches shall be tested by closing sprinkler valves. On dry type sprinkler systems, the air pressure shall be measured.
 4. Every audible alarm signaling device shall be sounded.
 5. Every visual alarm signaling device shall be lighted or flashed.
 6. Every system control function shall be tested for its proper operation, including fan shutdown, smoke purge and elevator recall.
 7. All circuits shall be opened at two (2) locations to test for proper supervision.
 8. Any and all other tests which the inspector from the Bureau of Fire Prevention shall request.
- E. If any of the tests shall fail to indicate proper operation or if the Fire Department inspector issues a list of faults or objections to the system, the Contractor shall immediately correct all faults and improper functioning as part of his Contract obligation. He shall furnish and install all labor and materials that is necessary to accomplish this. The Contractor shall then reschedule the final acceptance test, file a new A-433 form, and redo all tests until the system is accepted without qualification.
- F. Upon successful completion of all final acceptance tests, the Contractor and Manufacturer's representative shall co-sign letters attesting to the completion of testing and forward two (2) copies of said letters to the Authority's Representative, the Bureau of Fire Prevention, Contractor's representative and the Manufacturer's representative.
- G. All final acceptance testing shall be done at a time convenient to the Bureau of Fire Prevention official and the Authority's Representative and all testing costs shall be born by the Contractor as part of this Contract.

3.3 CLOSEOUT DOCUMENTATION AND TRAINING

- A. The Contractor shall compile and provide to the City of New York, manuals on the finished system to include: operating and maintenance instructions, manufacturer's catalog pages of all equipment and components, all as-built wiring diagrams (both floor plan and riser types) and a manufacturer's suggested spare parts list.
- B. In addition to the above manuals, the Contractor shall provide the services of a trained manufacturer's employee for two (2) training sessions a period of four (4) hours, during normal business hours, to instruct the Custodian or building manager on the operation and maintenance of the entire system. The first shall be conducted after final acceptance, the second shall take place after six (6) months as a retraining course. The Contractor may schedule this session in conjunction with the first semi-annual maintenance as required under this Contract.
- C. The Contractor shall provide Sensitivity Reports for all smoke detectors (Ionization and photoelectric types).

END OF SECTION 283111

THIS PAGE LEFT INTENTIONALLY BLANK

SECTION 31 20 00

EARTHWORK

PART 1 - GENERAL

1.1 SUMMARY

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.
- C. This Section includes the following:
 - 1. Preparing subgrades for slabs-on-grade and paved area.
 - 2. Excavating and backfilling for buildings, structures.
 - 3. Excavating and backfilling for utility trenches.

1.2 DEFINITIONS

- A. Backfill: Soil 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. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
- C. 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. Authorized additional

excavation and replacement material will be paid for according to Contract provisions changes in the Work.

2. 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, shall be without additional compensation.

- D. Fill: Soil materials used to raise existing grades.
- E. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
- F. Subgrade: Surface or elevation remaining after completing excavation, or top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- G. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.3 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt utilities serving facilities occupied by The City of New York or others unless permitted in writing by Commissioner and then only after arranging to provide temporary utility services according to requirements indicated.

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: ASTM D 2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM, 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 D 2487, 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. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

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.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Preparation of subgrade for earthwork operations including removal of vegetation, topsoil, debris, obstructions, and deleterious materials from ground surface.
- C. Protect and maintain erosion and sedimentation controls during earthwork operations.

3.2 EXCAVATION

- 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.

3.3 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.

3.4 EXCAVATION FOR UTILITY TRENCHES

- A. Excavate trenches to indicated gradients, lines, depths, and elevations.

- 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: As indicated.

- C. 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.

- 1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material, 4 inches deeper elsewhere, to allow for bedding course.

3.5 SUBGRADE INSPECTION

- A. Proof-roll subgrade with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
- B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Commissioner, without additional compensation.

3.6 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 or utility pipe as directed by Commissioner.

3.7 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.

3.8 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. 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.
- D. 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.
- E. 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 utility pipe or conduit.
 - 1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
- F. Place and compact final backfill of satisfactory soil to final subgrade elevation.
- G. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.9 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 building slabs/footings/foundations, use engineered fill.

3.10 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.

3.11 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 D 698:
 - 1. Under structures, building slabs, steps, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
 - 2. For utility trenches, compact each layer of initial and final backfill soil material at 95 percent.

3.12 SUBBASE AND BASE COURSES

- A. Place subbase and base course on subgrades free of mud, frost, snow, or ice.
- B. On prepared subgrade, place subbase and base course under pavements and walks as follows:
 - 1. Shape subbase and base course to required crown elevations and cross-slope grades.
 - 2. Compact subbase 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 D 698.

3.13 FIELD QUALITY CONTROL

- A. Testing Agency: The City of New York will engage a qualified independent geotechnical engineering testing agency to perform field quality-control testing.
- B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work comply with requirements.
- C. 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.
- D. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable.

- E. When 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 to depth required; recompact and retest until specified compaction is obtained.

3.14 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.
- 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.

3.15 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off The City of New York's property.

END OF SECTION 31 20 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 312319

DEWATERING

PART 1 - GENERAL

1.1 SUMMARY

- A. Work of this Section, as shown or specified, shall be in accordance with the requirements of the Contract Documents.
- B. Section includes construction dewatering.
- C. LEED BUILDING - GENERAL REQUIREMENTS:
The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.
- D. Related Sections:
 - 1. Construction Waste Management and Disposal - Section 017419
 - 2. Sustainable Design Requirements (LEED Building) - Section 018113
 - 3. Construction IAQ Requirements - Section 018119

1.2 PERFORMANCE REQUIREMENTS

- A. Dewatering Performance: Design, furnish, install, test, operate, monitor, and maintain 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.

1.2 SUBMITTALS

- A. Shop Drawings: For dewatering system. Show arrangement, locations, and details of wells and well points; locations of risers, headers, filters, pumps, power units, discharge lines,

piezometers, and flow-measuring devices; and means of discharge, control of sediment, and disposal of water.

- B. Delegated-Design Submittal: For dewatering system indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. LEED BUILDING Submittal Requirements:
 - The contractor or subcontractor shall submit the following LEED BUILDING certification items:
 - 1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Section 018113 sustainable Design Requirements (LEED BUILDING) of these specifications.
 - 2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
 - 3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION
 - 4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).
 - 5. The LEED BUILDING Submittal information shall be assembled into one package per Specification section (or per subcontractor), and sent to the LEED Consultant for review.

1.3 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with governing EPA and other agency notification regulations before beginning dewatering. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Preinstallation Conference: Conduct conference at Project site.

1.4 PROJECT CONDITIONS

- A. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.
 - 1. During dewatering, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify

Commissioner if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Provide temporary grading to facilitate dewatering and control of surface water.
- B. Monitor dewatering systems continuously.
- C. Protect and maintain temporary erosion and sedimentation controls during dewatering operations.
- D. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.
 - 1. Space well points or wells at intervals required to provide sufficient dewatering.
 - 2. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.
- E. Before excavating below ground-water level, place system into operation to lower water to specified levels. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer required.
- F. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata above and below bottom of foundations, drains, sewers, and other excavations.
 - 1. Do not permit open-sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability.
- G. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.
 - 1. Maintain piezometric water level a minimum of 24 inches below surface of excavation.
- H. Provide standby equipment on site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to City of New York.

1. Remove dewatering system from Project site on completion of dewatering. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction.

END OF SECTION

SECTION 31 50 00

EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes temporary excavation support and protection systems.
- B. Related Sections
 - 1. Construction Waste Management and Disposal - Section 017419
 - 2. Sustainable Design Requirements (LEED Building) - Section 018113
 - 3. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3
 - 4. Construction IAQ Requirements - Section 018119

1.2 PERFORMANCE REQUIREMENTS

- A. Contractor to design, furnish, install, monitor, and maintain excavation support and protection system capable of supporting excavation sidewalls and of resisting soil and hydrostatic pressure and superimposed and construction loads.
 - 1. Provide professional engineering services needed to assume engineering responsibility.
- B. LEED BUILDING - GENERAL REQUIREMENTS:

The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.3 PERFORMANCE REQUIREMENTS

- A. Contractor to design, furnish, install, monitor, and maintain excavation support and protection system capable of supporting excavation sidewalls and of resisting soil and hydrostatic pressure and superimposed and construction loads.

- 1. Provide professional engineering services needed to assume engineering responsibility.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide materials that are either new or in serviceable condition.
- B. Structural Steel: ASTM A 36/A 36M, ASTM A 690/A 690M, or ASTM A 992/A 992M.
- C. Steel Sheet Piling: ASTM A 328/A 328M, ASTM A 572/A 572M, or ASTM A 690/A 690M; with continuous interlocks.
- D. Wood Lagging: Lumber, mixed hardwood, nominal rough thickness of 4 inches.
- E. Cast-in-Place Concrete: ACI 301, of compressive strength required for application.
- F. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

PART 3 - EXECUTION

3.1 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.
- B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
- C. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to ensure that excavation support and protection systems remain stable.
- D. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

3.2 REMOVAL AND REPAIRS

- A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and bear soil and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils or damaging structures, pavements, facilities, and utilities.
 - 1. Remove excavation support and protection systems to a minimum depth of 48 inches below overlying construction and abandon remainder.
 - 2. Repair or replace, as approved by commissioner, adjacent work damaged or displaced by removing excavation support and protection systems.
- B. Leave excavation support and protection systems permanently in place.

END OF SECTION 31 50 00

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 321400

UNIT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. LEED BUILDING - GENERAL REQUIREMENTS:

The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.2 SUMMARY

A. Section Includes:

1. Pre-cast concrete pavers set in aggregate setting beds.
2. Asphalt block pavement on asphalt concrete base in connection with and to match adjacent Department of Parks and Recreation property
3. Granite cobblestone pavers in street tree pit
4. Mortar setting bed.

B. Related Sections

1. Construction Waste Management and Disposal - Section 017419
2. Sustainable Design Requirements (LEED Building) - Section 018113
3. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3
4. Construction IAQ Requirements - Section 018119
5. Architectural Concrete- Section 033300

6. Miscellaneous Metals- Section 055000

1.3 ACTION SUBMITTALS

A. Product Data: For materials other than water and aggregates.

B. LEED BUILDING Submittal Requirements:

The contractor or subcontractor shall submit the following LEED BUILDING certification items:

1. Material cost breakdowns, submitted in the format of the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, per Sustainable Design Requirements (LEED Building) - Section 018113 of these specifications.
2. Additional information to complete the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
3. Letters of Certification, Product Cut Sheets, Material Safety Data Sheets, or other items to support the information provided in the ENVIRONMENTAL BUILDING MATERIALS CERTIFICATION FORM, as requested by the LEED Consultant.
4. Material Safety Data Sheets, for all applicable products. Applicable products include, but are not limited to adhesives, sealants, carpets, paints and coatings. Material Safety Data Sheets shall indicate the Volatile Organic Compound (VOC) limits of products submitted (If an MSDS does not include a product's VOC limits, then product data sheets, manufacturer literature, or a letter of certification from the manufacturer can be submitted in addition to the MSDS to indicate the VOC limits).

The LEED BUILDING Submittal information shall be assembled into one package per specification section (or per subcontractor), and sent to the LEED Consultant for review.

C. Product Data: For the following:

1. Pavers
2. Aggregate

D. Shop Drawing:

1. Submit a layout drawing showing paving pattern
 2. Submit a drawing showing adjacent work of other Contracts or trades, stair assembly, profiles and jointing.
- E. Asphalt Base Formula: submit for approval.
- F. Adhesion and Compatibility Test Reports: From latex-additive manufacturer for mortar and grout containing latex additives.
- G. Shop Drawings: Shop drawings for the fabrication and installation of all pavers. Include plan at not less than 1/2" to 1'-0" scale, and include details of custom-sized pavers at not less than 3" to 1'-0" scale. Show installation assembly.
- H. Sieve Analyses: For aggregate setting-bed materials, according to ASTM C 136.
- I. Samples for Initial Selection: For the following:
1. Each type of unit paver indicated.
 2. Joint materials involving color selection.
 3. Aggregate
- J. Samples for Verification:
1. 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.
 2. Joint materials.
 3. Aggregate

1.4 QUALITY ASSURANCE

- 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.
- B. Mockups: Build mockups to show an area of pavement in which each paver dimension is included, to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 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 where grading and other required characteristics can be maintained and contamination avoided.

1.6 PROJECT 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.

PART 2 - PRODUCTS

2.1 PAVING IN CONNECTION WITH ADJACENT PARK

- A. Asphalt block pavement on asphalt concrete base
 - 1. The layout of pavers shall match the existing and adjacent pattern to be approved by the NYC Department of Parks and Recreation Commissioner. All edges, borders, and corners of the paved area shall be finished to rue and neat lines. Special cutting, soldier courses, color patterns, various shapes, and variations in size and finish may all included in this work.
- Products:

Base Course: The material for the base course shall meet the requirements of the latest edition of the N.Y.S. Department of Transportation Standard Specifications Section 400 "Bituminous Pavement".

Composition of the asphalt concrete binder shall be Type 3 as indicated in the following table:

COMPOSITION OF BINDER TYPE 3

SCREEN	GENERAL LIMITS	JOB MIX
SIZE	% PASSING	TOL. %
1 1/2"	100	---
1"	95-100	---
1/2"	70-90	+/-6
1/4"	48-74	+/-7
1/8"	32-62	+/-7
No. 20	15-39	+/-7
No. 40	8-27	+/-7
No. 80	4-16	+/-4
No. 200	2-8	+/-2
Asphalt Content, %	4.5-6.5	+/-0.4

Asphalt Cement shall be 100 percent soluble in Trichloroethylene. The mixing and placing temperature shall be 250° to 325° F. The Viscosity of the asphalt shall be AC 20.

The mix shall have a minimum Marshall Stability of 500 lbs., flow of 8 to 16, and percent of air voids 3 to 5 percent.

The asphalt mix may contain a maximum of 15% by weight of Recycled Asphalt Pavement (R.A.P.) material. The R.A.P. shall be certified by the inspection service before use and shall be free of dirt, debris, garbage, metal, glass and any other deleterious material. R.A.P. shall be tested by an approved laboratory for (%) percent asphalt cement before mixing. R.A.P. shall be screened prior to mixing so that final mix meets the specification. The City reserves the right to reject the R.A.P. asphalt mix if in the determination of the Engineer, the mix is contaminated with dirt, debris, garbage, metal, or glass.

Bituminous Setting Bed: Asphalt cement to be used in the bituminous setting bed shall conform to PGA 64-22, ASTM D6373 for Performance Graded Asphalt.

The fine aggregate to be used in the bituminous setting bed shall be clean, hard sand with durable particles and free from adherent coatings, lumps of clay, alkali salts and organic matter. It shall be uniformly graded from "coarse" to "fine" and all passing the No. 4 sieve and meet the gradation requirements when tested in accordance with the standard method of test for sieve or screen analysis of fine and course aggregates ASTM C136.

The dried fine aggregate shall be combined with hot asphalt cement, and the mix shall be heated to approximately 300° F. at an asphalt plant. The approximate proportion of materials shall be seven (7) percent cement asphalt and ninety-three (93) percent fine aggregate. Each ton shall be apportioned by weight in the approximate ratio of 145 lbs. asphalt to 1,855 lbs. sand. The Contractor shall determine the exact proportions to produce the best possible mixture for construction of the bituminous setting bed to meet construction requirements.

Bituminous setting shall be manufactured by Cofire Paving Corp., Flushing, NY, Inter-county Asphalt Supply, Hauppauge, NY, or approved equal.

Tack Coat: shall be # 237 2% Neo-Asphalt, Brush Grade as manufactured by Hanover Architectural Products, Hanover, PA, or approved equal. Tack coat shall be an asbestos free, cold applied, rubberized asphalt cement, and shall consist of two percent (2%) neo-

prene rubberized asphalt with 150⁰ softening point and 6.5 percent (6.5%) inorganic material.

Asphalt Block: Unless otherwise noted on the plans, all pavers shall be hexagonally shaped asphaltic concrete blocks, eight (8") inches between parallel sides and two (2") inches in thickness, with a permissible plus or minus tolerance of one-sixteenth (1/16") inch in any dimension.

The blocks shall be composed of approximately 6.5% \pm (plus or minus) .5% high melting point oxidized asphalt conforming to ASTM Designation D-312 for type 3 asphalt and 94% graded crushed rock aggregate and mineral filler; at the temperature of 300 degrees F^o the mix is compressed 4,000 lbs. per square inch by high speed high speed hydraulic presses.

The blocks shall be as manufactured by Hanover Architectural Products, Inc. of Hanover, Pa., or approved equal. Top exposed surface of blocks shall have a ground finish, exposing a small aggregate, similar in appearance to Hanover's Matrix #10, unless otherwise noted in the Contract Drawings. The total recycled content of the blocks shall be 23.6%, or approved equal.

Forms: The forms for this work shall be of wood of an approved type and a minimum length of ten (10) feet for tangents and curves, unless otherwise shown on the plans.

All forms shall be straight, free from bends and warps at all times, and shall be cleaned thoroughly and oiled before pavement is placed against them; this cleaning and oiling being repeated daily as the forms are moved ahead. The forms shall rest firmly upon the thoroughly compacted sub-grade throughout their entire length, shall be joined neatly and tightly and staked securely to line and grade at least two hundred (200) feet in advance of the point of placement by using at least three (3) bracing pins or stakes to each ten (10) foot length of side form, so that they will resist the pressure of the pavement and the impact of the roller without springing.

Approval of Sources of Supply: Approval of the sources of aggregate shall be obtained from the Engineer prior to the delivery of material.

Laboratory Testing: The Contractor shall, at the direction of the Engineer, or when quantities exceed 30 (thirty) cubic yards, furnish a certified report by an approved Materials Testing Laboratory showing the materials composition, sieve analysis, plasticity index,

and soundness of the representative samples of recycled material which they propose to use.

The Engineer will deliver the samples to an independent testing laboratory. The Contractor shall bear responsibility for all costs associated with laboratory testing. No recycled material shall be delivered to the site until positive test results have been obtained. The Engineer reserves the right to reject on or after delivery any material which does not, in their opinion, meet these specifications.

2.2 PAVERS AT NORTH OF BUILDING

- A. Pre-cast Pavers: complying with ASTM C 615 and in conformance with New York City DOT requirements for street and sidewalk materials.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - 1) Wausau
 - 2) Hastings
 - 3) Stepstone Pavers
 - 4) Or approved equal
 - 2. Color and Grain: Selected from manufacturer's standard chart
 - 3. Finish: Not textured but with sufficient slip resistance to provide a suitable path of egress.
 - 4. Thickness: Not less than 2 inches unless otherwise indicated.
 - 5. Face Size: 24" x 24"

2.3 AGGREGATE SETTING-BED MATERIALS

- A. Graded Aggregate for Subbase: Sound, crushed stone or gravel complying with ASTM D 448 for Size No. 57.
- B. Graded Aggregate for Base: Sound, crushed stone or gravel complying with ASTM D 2940, base material.
- C. Sand for Leveling Course: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C 33 for fine aggregate.
- D. Sand for Joints: Fine, sharp, washed, natural sand or crushed stone with 100 percent passing No. 16 sieve and no more than 10 percent passing No. 200 sieve.
 - 1. Provide sand of color needed to produce required joint color.

- E. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications; made from polyolefins or polyesters, with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
1. Survivability: Class 2, AASHTO M 288.
 2. Apparent Opening Size: No. 60 sieve, maximum; ASTM D 4751.
 3. Permittivity: 0.02 per second, minimum; ASTM D 4491.
 4. UV Stability: 50 percent after 500 hours' exposure, ASTM D 4355.

2.4 STONE MATERIALS – SALVAGED OR NEW COBBLES FOR TREE PIT

A. Characteristics and Quality:

1. Units shall be sound stock, and free from defects impairing strength, durability or appearance, such as cracks, seams, starts, holes, flaws or imperfections which have been patched or filled.
2. Units shall be uniformly consistent in color, value, graining texture, and other features to the extent inherent in each stone type.
3. Units shall be clean, used, split-face cobbles, 4" deep, and with 4"x 8" face sizes.
4. Stone shall be cut to sizes, shapes, dimensions, and details shown on the drawings for each type and condition. There shall be no deviation from jointing shown or specified.
5. Exposed surfaces and edges of stone units shall be free from cracks, broken corners, chipped edges, scratches, or defects affecting appearances. No patching or hiding of defects will be permitted.
6. Shop Cutting, Drilling and Fitting: Include all cutting, drilling, and fitting of stone required to accommodate the work of other trades and to fit conditions on-site. In cutting and fitting, carefully cut and grind edges to a neat, tight, fit. Cutting shall be in such a manner so as not to impair strength or appearance.

2.02 INSTALLATION MATERIALS

- A. Sand Setting Bed Material: Provide clean, washed natural sand aggregate with material and grading in accordance with ASTM C-33.
- B. Structural Planting Soil Composition: As specified under "Structural Planting Soil" in Section 02950.

- C. Sand Joint Treatment (Filler): Sand shall conform to the following gradation in accordance with ASTM C144-84 and shall be a combination of manufactured sand and natural sand:

SIEVE SIZE	PERCENT FINES BY WEIGHT
No. 4	100
No. 8	95 – 100
No. 16	70 – 100
No. 30	40 – 75
No. 50	20 – 40
No. 100	10 – 25
No. 200	0 – 10
% Fracture, by weight, Minimum:	75
Sand Equivalent, Minimum	40

1. The fracture requirement shall be at least two mechanically fractured faces and will apply to material retained on each sieve size No. 50 and above.
2. Color of Sand: Provide natural light color (not white) selected and approved by Owner/Designer, and as determined by color selection of joint filler.
3. Portland Cement: ASTM C150, Type 1, non- staining, standard color, and Type III. Provide one source used to suit conditions specified.
 - a) Color of cement for final joint treatment: Use light gray cement color as approved by Owner/Designer.

D. Geotextile Filter Fabric

Acceptable products include but are not limited to:

- a. "Hydronet Filter Fabric", Atlantic Geotextiles
20100 E 35th Drive, Aurora, CO 80011-8160
800-233-1510 or 303-373-1234

woven recycled polypropylene

- b. "Filter Fabric", Invisible Structures, Inc.
20100 E 35th Drive, Aurora, CO 80011-8160
800-233-1510 or 303-373-1234
100% recycled HDPE non-woven filter fabric
- c. "Hydronet Filter Fabric", EnviroSafe Products Corporation
355 Eisenhower Pky; Livingston, NJ 07039
973-535-1414
100% recycled PET & PVC
- d. Or approved equal.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas indicated to receive paving, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Proof-roll prepared subgrade according to requirements in Division 31 Section "Earthwork" 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.

3.3 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.
- D. Joint Pattern: As indicated on A615.
- E. Tolerances: Do not exceed 1/32-inch unit-to-unit offset from flush (lippage) nor 1/8 inch in 10 feet from level, or indicated slope, for finished surface of paving.

3.4 AGGREGATE SETTING-BED APPLICATIONS

- A. Compact soil subgrade uniformly to at least 95 percent of ASTM D 698 laboratory density.
- 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 Commissioner, and replace with compacted backfill or fill as directed.
- C. Place separation geotextile over prepared subgrade, overlapping ends and edges at least 12 inches.
- D. Place aggregate subbase and base, compact by tamping with plate vibrator, and screed to depth indicated.
- E. Place drainage geotextile over compacted base course, overlapping ends and edges at least 12 inches.
- F. Place leveling course and screed to a thickness of 1 to 1-1/2 inches, taking care that moisture content remains constant and density is loose and uniform until pavers are set and compacted.
- G. Treat leveling course with herbicide to inhibit growth of grass and weeds.
- H. Set pavers with a minimum joint width of 3/8 inch and a maximum of 1/2 inch, being careful not to disturb leveling base. If pavers have spacer bars, place pavers hand tight against spacer bars. Use string lines to keep straight lines. When installation is performed with mechanical equipment, use only unit pavers with spacer bars on sides of each unit.

- I. 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.
- J. 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.
- K. Do not allow traffic on installed pavers until sand has been vibrated into joints.
- L. Repeat joint-filling process 30 days later.

3.5 INSTALLATION OF ASPHALT BLOCK PAVEMENT

Subgrade Preparation: The subgrade shall be compacted with equipment that will yield the following density:

Cohesive Subgrade - Minimum of 95% of AASHTO T 180 Method D density

Cohesionless Subgrade - Minimum of 100% of AASHTO T 180 Method D density

The Contractor shall remove from the subgrade all debris, foreign and other undesirable material which interferes with satisfactory construction. The fine grade shall not be muddy or otherwise unsatisfactory when the base course material is placed upon it. If the

fine grade becomes rutted or displaced, due to any cause whatsoever, the Contractor shall regrade same without additional payment.

Spreading of Base Course: The asphalt cement base course shall be laid by means of a mechanical spreader of approved design to a depth, which after compaction, shall be equal to the specified depth. In areas where the use of a mechanical spreader is impractical, as determined by the Engineer, other approved means of spreading and compacting may be permitted. The use of hand rakes will not be permitted. The Contractor shall use lutes where necessary.

Rolling of Base Course: The asphalt concrete base course when properly spread shall be rolled with one or more approved power driven rollers weighing not less than 10 tons. Rolling shall proceed continuously not in excess of the following rates:

<u>Method of Placement</u>	<u>Square Yd/Hr/Roller</u>
----------------------------	----------------------------

Hand	800
------	-----

Machine	1200
---------	------

After final compacting, the base course shall have a density of not less than 95% of the theoretical maximum density as calculated in accordance with Appendix B of the Asphalt Institute Manual, MS-2

After compaction of the base course and before the placing of the asphaltic block, the binder course shall be checked for depressions and high spots. The Contractor shall check the entire surface using a 10 foot wood or metal straight edge. Any depressions or high spots greater than three-sixteenths (3/16) of an inch shall be satisfactorily corrected before placing the asphalt block.

Bituminous Setting Bed: To install the setting bed over the surface of the base, place 3/4" deep control bars directly over the base course. If grades must be adjusted, set wood chocks under depth control bars to proper grade. Set two bars parallel to each other

approximately 11 feet long (2" x 6" board). The depth of control bars must be set carefully to bring the paver, when laid, to the proper grade

Place some bituminous material between the parallel depth control bars. Pull this bed with the striking board over these bars several times. After each passage, low porous spots must be showered with fresh bituminous materials to produce smooth, firm and even setting bed. As soon as this initial panel is completed, advance the first bar to the next position in readiness for striking the next panel.

Carefully fill up any depressions that remain after removing the depth control bars and wood chocks.

Bed shall be spread in a continuous workmanlike manner. Installation of base in spotted, different and isolated areas will not be accepted. Bed depth greater than 1-1/8" will not be acceptable.

After setting bed has cooled, it shall be rolled by hand with a 100 lb. roller to eliminate sponginess and to prepare the surface for the installation of the tack coat.

Setting bed shall be protected against all pedestrian traffic and construction equipment to insure a level surface for setting pavers.

Tack Coat: The neoprene-modified asphalt adhesive tack coat shall be applied by mopping, squeegeeing or troweling over the top of the bituminous setting bed so as to provide a bond between the bituminous setting bed and the paver.

Setting Pavers: When modified asphalt adhesive is dry to touch, carefully place the pavers by hand, ground finish side up unless otherwise specified, in straight course, with hand tight joints and uniform top surfaces, keeping full alignment according to the patterns shown on the plans.

Pavers may vary slightly in shade and tonality. Installer shall work from at least four (4) pallets at a time in order to create a uniform blend of paver shades.

Joints between blocks shall have a maximum width of one-eighth (1/8") inch.

All blocks shall be cleaned when placed on the pavement.

In no case shall the bituminous setting bed in front of the pavement be disturbed or walked on during the laying of the blocks.

Joint Filler: Upon the completion of the work of laying the blocks in each section to the satisfaction of the Engineer, the surface of the blocks shall be swept clean, and the joints filled with fine sand.

All joints shall be filled the same day as the blocks are laid. Filler shall not be applied if the blocks are wet or if the air conditions are such that the filler does not readily enter the joints. Filler shall be well worked into the joints by means of squeegees or other approved devices operating slowly backward and forward. Squeegeeing shall continue until the joints are flush with top surface. Immediately after the joints are filled, the pavement shall be lightly sprayed and cleaned.

Defects: Where defects in composition, compression or finished appear in the complete work, such finished areas shall be removed to the full depth of the course and the defective material replaced with the required thickness of pavement at the expense of the Contractor for such removing and replacing

Cold Weather: Asphalt base course shall be mixed and placed in accordance with minimum placement temperature as specified in the following table:

MINIMUM PLACEMENT TEMPERATURES						
SURFACE TEMP. (F)	MAT THICKNESS IN INCHES					
	1/2"	3/4"	1"	1 1/2"	2"	3"
TEMPERATURE OF THE MIX						
+32-40	--	--	--	305	295	280
+40-50	--	--	310	300	285	275
+50-60	--	310	300	295	280	270

+60-70	310	300	290	285	275	265
+70-80	300	290	285	280	270	265
+80-90	290	280	275	270	265	260
+90	280	275	270	265	260	255
ROLLING TIME MINUTES	4	6	8	12	15	15

Unless notified by the Engineer in writing, no material shall be mixed or placed when the temperature is at, or lower than 50° F.

Precipitation Probability: Placement of bituminous paving materials shall not be scheduled when the Precipitation Probability, obtained by the Contractor from the U.S. Weather Bureau within three (3) hours prior to the start of such operations, equals or exceeds fifty (50) percent. The Contractor shall notify the Engineer of the exact time at which the above information was obtained.

3.6 REPAIRING, 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.

3.7 PAVING SURFACE INSTALLATIONS

A. General:

1. Pattern: Per DOT standard detail H-1046
2. Cobblestone paving units shall be cut or drilled as appropriate to conditions to fit around items penetrating grade and to adjust pattern/slope conditions of paving design as approved. Cut around site objects only, such as lights, manholes, etc. Execute cutting with a high-speed masonry saw producing squared, clean, and sharp edges. See Details for examples.

- b. Cobblestone units which are cut or split, such as required to accommodate utility elements or other adjacent conditions, shall have a minimum 4" depth, with a 2"x3" face size.
- 3. The surface edge of one paver unit shall be level with the next adjacent pavers so that no voids, rocking motions, or tripping hazards are encountered. In addition, comply with specified tolerances.
- 4. Tolerances
 - a. Variation of Slope and Grade: Check slope and grade of installed paving units with a 12-foot long straightedge. Surface shall be true to grades and slopes indicated within 1/8" in 10 feet.
 - b. Offset at Joints: Do not exceed plus or minus 1/32".
 - c. Joint width: Maximum 3/4".

B. Dry Setting Bed Over Structural Planting Soil

- 1. Install geotextile fabric over compacted base course.
- 2. Provide a uniform bedding plane parallel to the finished pavement surface. The bed material shall be screeded to a surface tolerance of plus or minus 3/16-inch, giving a compacted thickness of 1 inch. The screeded course will be compacted with a light vibratory roller. The compacted bed material shall then be screeded again to a depth of 1/4-inch.
- 3. Paving cobbles shall be installed to fit together accurately with hand tightened joint widths as indicated on Drawings.
- 4. Joint Treatments:
 - a. If joint treatment installations are performed more than two (2) days after paver unit installation, or at such other times as conditions warrant, use a powered air blower to clean paving joints of debris before applying joint treatment.
 - b. For sand joints: Initial joint filler treatment of sand shall be spread and broom swept over the installed pavers. Next, at least one pass of the plate vibrator shall be made to consolidate the joint material in the joints. Sand shall then be swept into the joints until joints are filled flush to the top of the paving stones. Sweep excess material clean from the paving surface.

3.03 CLEANING AND REPAIRING

- A. Protect finished cobble paving surface from ongoing construction activity. If construction activity must cross surfaces of finished paved surfaces, place clean plywood or planks in the lane of traffic flow and restrict traffic to protected areas.
- B. Replace or repair defective, broken or damaged cobbles or system components. Defective setting beds shall be removed and replaced. Unfilled or defective joints shall be repaired in compliance with specification requirements for installations.
 - 1. System defects shall include, but not be restricted to, non-solid foundations, heaving, loosening under service conditions, uneven joints, uneven settling, stains, marks, evidence of improper bedding or alignment, and other imperfections of material and workmanship impairing performance, suitability for intended use or appearance.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 32 93 43
STREET TREES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. LEED BUILDING - GENERAL REQUIREMENTS:

The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.02 SECTION INCLUDES

A. The work of this Section includes all labor, materials, equipment and services necessary to complete the pavements as shown on the drawings and/or specified herein, including but not necessarily limited to the following:

1. Excavation of Tree Planting Trench;
2. Prepare sub grade;
3. Perform Percolation Tests;
4. Install CU – Structural Soil™ mixtures;
5. Provide and install new Street Trees;
6. Provide additional mulch, fertilizer, and soil amendments, if necessary;
7. Staking and guying including necessary hardware;
8. Pest and disease control
9. Coordinate with other Trades;
10. Preparation for Pavement;
11. Protecting and maintaining the completed work;
12. Warranty and Maintenance
13. Clean up.

B. Related Sections:

1. Construction Waste Management and Disposal - Section 017419
2. Sustainable Design Requirements (LEED Building) - Section 018113
3. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3
4. Construction IAQ Requirements - Section 018119
5. Excavation, Support & Protection- Section 315000

- C. **Extent of Landscaping Work:** In addition to the work indicated, Landscape work includes restoring all areas within the Limit of Work disturbed by the work of the Contract and coordination of work with other subcontractors.

1.03 EXAMINATION OF CONDITIONS

- A. The contractor shall fully inform himself of existing conditions of the site before submitting his bid, and shall be fully responsible for carrying out all site work required to fully and properly executing the work of the Contract, regardless of the conditions encountered in the actual work. No claim for extra compensation or extension of time will be allowed on account of actual condition inconsistent with those assumed.
- B. Plans, surveys, measurements and dimensions under which the work is to be performed are believed to be correct to the best of the Commissioner's knowledge, but the Contractor shall have examined them for himself during the bidding period, as no allowance will be made for any errors or inaccuracies that may be found therein.

1.04 SUBMITTALS

- A. **Product Data:** Provide manufacturer's data for each type of product showing installation and limitations in use.
- B. **Product Certificates:** For each type of manufactured product, signed by product manufacturer, and complying with the following: Supply certificates of compliance for all materials required for installation, certifying that each material item complies with or exceeds specific requirements.
- C. **Qualification Date for Landscape installer.**
- D. **Samples and submittals for verification:** Prior to ordering the below listed materials, submit representative samples to Commissioner for selection and approval as follows. Do not order materials until Commissioner's approval has been obtained. Delivered materials shall closely match the approved samples.
- E. **Delivery and Storage:** Prior to construction the Contractor shall submit for the Commissioner's review and approval showing proposed routing for deliveries and access to the site.
- F. **Plant Source:** The Contractor shall submit for the Commissioner's review and approval a list indicating the plant botanical and common name, size, quantity, form, root ball, limb height (if applicable), and source for the plants. Plant list shall clearly indicate deviations from specified plant list and any proposed substitutions.
- G. **Plant Photographs:** Provide photographs of plant materials as indicated herein.
- H. **Planting Schedule:** Indicate anticipated planting dates for plants.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of exterior plants
 - 1. Installer's Field Supervision: Require Installer to maintain an experienced fulltime supervisor on Project site when exterior planting is in progress.
- B. Plant Materials: Provide quality, size, genus, species, and variety of exterior plants indicated. Provide only healthy, vigorous stock, grown in a recognized nursery acceptable to the Commissioner and free from disease, insects, eggs, larvae, and other defects. Provide plants in strict compliance with the recommendations of the following:
 - 1. ANSI Z60.1, American Standard for Nursery Stock, latest edition.
 - 2. American Association of Nurserymen, Horticultural Standards.
 - 3. American Joint Committee on Horticultural Nomenclature, Standardized Plant Names, 1942 edition.
 - 4. International Society of Arboriculture.
- C. Labeling: Label at least one specimen of each variety and size with a securely attached, waterproof tag bearing legible designation of botanical and common name in compliance with the recommendations of the American Nursery & Landscape Association.
- D. Tree Measurements: Measure according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Measure main body of tree for height and spread; do not measure branches or roots tip-to-tip.
- E. Pruning: Pruning of trees is prohibited except to remove dead or broken branches and limbs. Confer with Commissioner before any pruning. Plants pruned without permission from the Commissioner are subject to rejection and replacement. A certified Arborist must be present during all tree work.
- F. Inspection: Commissioner will inspect trees at place of growth before planting for compliance with requirements for genus, species, variety, size, and quality. Commissioner retains the right to inspect plant materials further for size and condition of root balls and root systems, insects, injuries, and latent defects and to reject unsatisfactory material at any time during progress of work even if previously inspected and approved. Remove and replace rejected plants immediately from Project site at no change to Contract amount.
 - 1. Selection: All plants shall be tagged in the nursery by the Commissioner prior to the digging of plants. The Commissioner shall place seals on selected plants at the nursery. Seals shall remain on plants until the acceptance of the work. At least three weeks prior to expected planting date, request, in

writing, the Commissioner's inspection of plant material at the nursery. The Commissioner shall make his or her own travel arrangements.

2. Photographs: At the Commissioner's option and/or request, the Contractor shall supply the Commissioner with photographs of plants for the project.
 - a. The photographs shall be taken at the nursery source. Photographs shall include images showing the full range of the characteristics of each plant including detailed photographs of the bark, the base of the tree (root ball crown), leaves, branching structure, form, and habit. Images shall include a scale figure or measuring device to indicate true size.
 - b. Contractor shall label each photograph with the plant species botanical name, nursery name, and date of photograph.
3. Nursery Source: The Commissioner shall have the right to reject any nursery source if he/she determines, before, during, or after inspection or receipt of plants, any of the following:
 - a. The nursery stock does not meet quality standards set forth herein;
 - b. The nursery stock does not meet the intended visual characteristics of the plants as determined by the Commissioner;
 - c. The nursery cannot supply the specified plant(s) or an acceptable substitute cultivar or species;
 - d. The nursery's cultural practices poor maintenance procedures do not meet specified standards;
 - e. Infestation with pest or disease

G. Pre-Installation Conference: Conduct conference at Project Site to comply with requirements in Division 1.

H. Plant Sources: The Contractor shall submit to the Commissioner any questions regarding the source of any plant.

I. LEED BUILDING - GENERAL REQUIREMENTS:

The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

1.06 PROJECT CONDITIONS AND COORDINATION

- A. Utilities: Determine and stake the location of underground utilities before project staking. Hand excavate as necessary to avoid damage.
- B. Concealed conditions: Notify Commissioner before planting when below-grade conditions detrimental to proper plant growth are encountered. Do not proceed with planting without specific written instructions from the Commissioner.
- C. Sequence of Planting: Plant trees after finish grades are established and before planting lawns or ground covers, unless otherwise approved by the Commissioner. Complete landscaping work as quickly as possible on portions of the site as they become available for planting.
 - 1. When planting trees after lawns or ground covers, protect planted areas and promptly repair damage caused by planting operations.
- D. Planting Seasons: Work only within seasonal limitations for proper planting as follows:

Item	Spring	Fall
Deciduous (B&B)	March 15 to May 1	Oct 1 to Nov 30

- E. Water: The Contractor shall bear the cost of supplying all water and shall reimburse applicable governing authorities for all water used for the project.
 - 1. Provide as needed water from sources free from impurities injurious to vegetation.
 - 2. Provide hoses and equipment as needed to distribute water to area of landscape work and areas needing watering. Provide water tank trucks as needed at no additional cost if water service is interrupted.
 - 3. Where water is supplied from City Hydrants, the Contractor shall obtain a hydrant permit from the Department of Environmental Protection. Permits are issued for a thirty-(30)-day period, and the Contractor is responsible for keeping the permits current. The permits are available from each borough office.
 - 4. The Contractor must have all tools necessary for using city hydrants in his possession at the time of planting to ensure that this specification is adhered to.
 - 5. If conditions do not allow the use of New York City water sources, the contractor must obtain their own source of water. No direct payment shall be made for water obtained from other than city sources, but the cost thereof shall be deemed included in various items of the contract.
- F. Weather Limitations: Plant only when ambient temperature is above 50° (10°C) and when temperature has not been below 35° F (1°C).
- G. Grade Control: Establish and maintain required lines and elevations. Review grades and lines with the Commissioner prior to starting work and as work progresses.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle packaged materials in strict compliance with manufacturer's instructions and recommendations. Protect all materials from damage, injury, and theft.
- B. Sequence deliveries to avoid delays, but minimize on-site storage.
 - 1. On-site storage is extremely limited and is restricted to a 24-hour period for any on material, plant, or group of plants. On-site storage is permissible only with written notice from the Contractor and Commissioner.
 - 2. Deliver materials and plants only after preparations for planting have been completed and accepted, including but not limited to: sub drainage system, irrigation, rough grading, utilities, decomposition or remediation of soils. The Commissioner shall determine if the site is acceptable for planting.
- C. Deliver plants freshly dug.
- D. Do not prune trees before delivery, except as approved by Commissioner. Protect bark, branches and root system from sun-scale, drying, sweating, whipping, and other handling and tying drainage. Do not bend or bind-tie trees in such a manner as to destroy their natural shape. Provide protective covering of trees during delivery. Do not drop trees during delivery.
- E. Handle planting by root-ball only. Do not lift, tip, or drag, or otherwise reposition plant materials by handling trunk, branches, twigs, or leaves.
- F. Deliver plants after preparations for planting have been completed and install immediately. If planting is delayed more than six (6) hours after delivery or if plants are to be stored off-site, set exterior plants in shade, protect them from weather and mechanical damage, and keep roots moist.
 - 1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, wood chips, straw mulch, or other acceptable material.
 - 2. Stored plant material shall be watered and misted several times a day if necessary to maintain proper root-ball moisture and to reduce transpiration in sunny or windy locations.
 - 3. For plants stored on-site for more than 12-hours, the Contractor must keep a maintenance log. The log shall include information on the watering, misting, and protection of plants. The date, time, type of maintenance, and name of maintenance personnel shall be included in the log.
- G. No plant shall be stored more than one week without written acceptance by the Commissioner.
 - 1. For plants that must be stored in cold weather, provide full insulation and protection of root-balls. Protect root-balls from cold damage.
 - 2. All plants shall be stored at the Landscape Contractor's facilities.
 - 3. Landscape Contractor shall fully maintain stored plants.

1.08 ACCEPTANCE AND MAINTENANCE

- A. Request for Acceptance: In writing, request Commissioner's inspection for acceptance at least 10 days in advance of preferred inspection date. Do not request inspection for acceptance until work is 100% complete (not including maintenance) and in compliance with the Contract requirements.
 - 1. Partial Acceptance: Acceptance of partial areas or portions of the total work may be granted at the Commissioner's option if the area to be inspected for acceptance is large, well defined, and easily described. The Commissioner is not obligated to provide partial acceptance of the work.
- B. Tree Maintenance: Begin maintenance immediately after planting. Provide complete maintenance and service as required to promote and maintain healthy growth including, without limitation, watering, and per the Commissioner's specifications, weeding, fallen leaf removal, treating for insects and disease, resetting plants to proper grade and upright position, and other operations and maintenance work. Throughout the maintenance period, restore planting saucers and mulch, and keep plant beds weed-free. Tighten and adjust guy wires, stakes, and deaden to keep trees in vertical position. Restore and replace damaged trunk wrappings.
 - 1. Maintenance Period: Completely maintain plants and trees until final acceptance.
 - 2. Watering: Flood all plants during construction and maintenance periods at least twice each week. Install tree irrigator bags at every tree; ensure that they are filled as necessary to meet the needs of the trees. If tree irrigation bags are not installed, provide hand watering as needed to maintain healthy growth. At each watering, thoroughly saturate the soil around each tree and shrub. If sufficient moisture is retained in the soil as determined by the Commissioner, the required watering may be reduced. Trees will require a minimum of ten gallons of water each watering.
 - 3. Applications of insecticides and herbicides are expressly prohibited. Confer with Commissioner's Representative for methods of controlling insect infestation or disease.

1.09 WARRANTY

- A. Provide written warranty agreeing to remove and replace work that exhibits defects in materials or workmanship for the specified periods. "Defects" is defined to include, but is not limited to, death, unsatisfactory growth, disease, insect infestation, abnormal foliage density, abnormal size, abnormal color, failure to thrive, and other unsatisfactory characteristics.
 - 1. Warranty period for trees: Two years from date of final acceptance.
 - 2. Replacement: Replace defective work with new material of same species, size, character, and quality of originally accepted work. With each replacement material, provide a new one year warranty for the replacement work. If a replacement is unacceptable during its one year warranty, the Contractor shall provide another replacement or, when approved by Commissioner, equivalent cash payment.

3. Replacement Planting Seasons: Replacement for plant warranty work shall comply with the Planting Seasons specified herein.
4. Commissioner's Responsibilities and Warranty Exclusions: After completion of the contractor's maintenance responsibilities, the Commissioner is responsible for maintaining the work in reasonable compliance with the Contractor's maintenance instructions. The Contractor's warranty shall exclude problems due to improper or inadequate maintenance (after the 30-day maintenance period) or vandalism.
 - a. During the warranty period, the Contractor shall visit the site at one month intervals to review the conditions of the accepted work. The Contractor shall submit in writing to the Commissioner his/her concerns regarding the Commissioner's maintenance practices and/or any vandalism. The content of this notice shall include a list of specific plants involved, the presumed problem, and a method of remedy for the problem(s) cited. The Commissioner shall make reasonable efforts to correct the problems cited by the Contractor but the Commissioner shall not be held responsible for the Contractor's defects in materials or workmanship that result in decline or death of plants.
 - b. Failure of the Contractor to make the required monthly review of the site during the warranty period and to submit written notice to the Commissioner of maintenance defects shall negate the Contractor's ability to make a claim against the Commissioner for negligence of maintenance.

PART 2 – PRODUCTS

2.01 PLANTS MATERIALS

- A. General: Furnish specimen, nursery – grown trees of genus, species, and cultivar specified complying with ANSI Z60.1, with healthy root systems well provided with fibrous roots developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sun scaled, injuries, abrasions, and disfigurement. All parts of the plant shall be moist and show active green cambium when cut.
- B. Provenance and Tree Size: All trees shall be nursery-grown within a 200-mile radius of New York City (material collected from the wild is unacceptable), except with permission from Central Forestry. Plants held in storage will be rejected if they show signs of growth during storage. Tree size shall be at least 2.5 inches measured at six inches from the ground and no larger than 3.5 inches in caliper unless otherwise authorized by Parks & Recreation.
- C. Grade: Provide plants of specified height, caliper, sizes, and grades complying with ANSI Z60.a for type of plant required.

1. Larger stock. Plants larger than required may be used if approved by Commissioner, if root ball is proportionately larger, and if there is no change in Contract Price. Maximum acceptable caliper: 5^{1/2}".
 2. Undersize stock. Not more than 10% of plants smaller than required may be used or approved by Commissioner, if equal number of oversize plants are provided to make average size equal or greater than size required, and if undersize plants are larger than the average size of the next lowest size grade.
- D. Hardiness: Provide plant stock certified to have been grown within hardiness Zones 2-7 as established by the Arnold Arboretum, Jamaica Plain, Massachusetts. Plants without certification will be rejected.
- E. Plant Character: All plants, except custom grown plants as shown on the Drawings, shall be typical of their species or variety and shall have a normal habit of growth and be legibly tagged with the proper name. Form and size shall comply with ANSI Z60.1.
1. Deciduous Trees: Single-stem trees with straight trunk, well-balanced crown, with intact leader and branching at least six feet from the ground, of height and caliper indicated.
- F. Trunk: The height of the trees (measured from the crown of the roots to the tip of the top branch) shall be not less than the minimum size designated. The trunk of each tree shall be a single trunk growing from a single un-mutilated crown of roots. No part of the trunk shall be conspicuously crooked as compared with normal trees of the same variety. The trunk shall be free from sunscald, frost cracks, or wounds resulting from abrasions, fire, or other causes. No pruning wounds shall be present having a diameter exceeding one inch and such wounds must show vigorous bark growth on all edges. Plants shall not be pruned prior to delivery. No trees with double-leaders or twin-heads shall be acceptable. The Contractor shall reject such plants at time of delivery by the nursery/supplier unless such plants were selected by the Commissioner as indicated by tags and seals.
- G. Root balls: All plants to be moved balled and bur lapped must be moved with the root systems as solid units with balls of earth firmly wrapped with untreated biodegradable eight ounce burlap, firmly held in place by a stout cord, drum-laced, or boxed, or in containers. All lacing cord must be biodegradable. The diameter and depth of the balls of earth must be sufficient to encompass the fibrous and root feeding system necessary for the healthy development of the plant. No plant shall be accepted when the ball of earth surrounding its roots has been badly cracked or broken before or during the process of planting or after the burlap, staves, ropes, or platform required in connection with its transplanting have been removed. The plants and balls shall remain intact during all operations. Inspect root crown for girdling roots. Plants with girdling roots will be rejected. Keep root balls damp and protected from damage due to sun and wind.
- H. Digging: All trees shall be dug immediately before moving unless otherwise specified.

- I. Handling of Plants; Plants delivered by truck and plants requiring storage on site shall be properly wrapped and covered to prevent wind-drying and desiccation of branches, leaves, and buds; plant balls should be firmly bound, unbroken, reasonably moist to indicate watering prior to delivery and during storage, and tree trunks shall be free from fresh scars and damage in handling.

2.02 PLANTING SOIL MIXTURE

- A. See section 329113 "Planting Soils" for planting soil mixture requirements. The Contractor shall strictly adhere to soil specifications composition of each section of the Work.
- B. Coordinate installation of soil mixes and plants to meet requirements of this Section and Section 329113 "Planting Soils".

2.03 MISCELLANEOUS MATERIALS

- A. Mycorrhizal Inoculants: Shall be a granular product containing both Endo- and Ecto-mycorrhizal fungi to colonize the roots of trees when applied to the root zones of plants at planting time such as Mycor Tree Saver Transplant, as manufactured by Plant Health Care, Inc. or an approved equal.
 1. Shall be applied by means of a three ounce (3 oz.) pre-measured dry formulation packet. Packets shall contain, at a minimum:
 - a. One thousand (1,000) live spores of Vesicular-Arbuscular fungi, including Entrophosphora Columbiana, Glomus clarum, Glomus etunicatum, and Glomus sp.;
 - b. Seventeen million five hundred thousand (17,500,000) live spores of Ectomycorrhizal fungi, including: Pisolithus tinctorius;
 - c. Biostimulants including Yucca schidegera extract;
 - d. Soluble sea kelp extract derived from Ascophylum nodosum;
 - e. Humic acids;
 - f. Acrylamide copolymer gel as a water absorbent medium.
- B. Water Retention Additive: Synthetic cross-linked polymer hydrogel, fine grade (1,000 microns or less), as follows.
 1. Soil Moist, as manufactured by JRM Chemical, Inc.
 2. Viterra Root Dip, as manufactured by Amereq, Inc.
 3. Terra-Sorb, as manufactured by Plant Health Care, Inc.
 4. Or approved equal.
- C. Anti-Erosion Mulch: Natural, undyed, shredded pine bark mulch, dark brown color.
- D. Silt Fence: Silt fence shall meet minimum requirement of New York City Department of Transportation standard. Silt fence shall be constructed in areas as shown on the erosion control plan and as requested by the Commissioner. The silt fence shall be maintained at all times.

- E. Anti-Desiccant: Use anti-desiccant only with the approval of the Commissioner. Provide emulsion-type, film-forming agent designed to permit vapor transmission but retard excessive moisture loss. Provide "Vapor Guard" or Commissioner approved equal.
- F. Stake and Guys: Provide 2"x2" cedar stakes for all balled and bur lapped trees, as shown on the drawings. Ties to be "Arbor Tie" manufactured by NEPTCO. Stakes shall be of white cedar with bark attached and shall show no sign of cracking or decay. They shall have a maximum allowable deflection of ten percent (10%). All trees shall be supported by two (2) stakes, they shall be eight (8) feet long; the diameter at the middle shall be not less than (2) inches no more than two and three quarters (2-3/4) inches and the diameter at the butt shall not exceed three (3) inches.
- G. Slow-Release Watering Device: Standard product manufactured for drip-irrigation of plants and emptying its water contents over a period of 2 to 9 hours; manufactured from UV-light stabilized nylon-reinforced polyethylene sheet, PVC, or HDPE plastic.
 - 1. 20-gallon, green color, UV-treated polyethylene water storage and distribution bags as manufactured by: TreeGator Watering Systems or approved equal.

PART 3 – EXECUTION

3.01 INSPECTION

- A. The Contractor shall examine previous work, related work, and conditions under which this work is to be performed and notify Commissioner in writing of all deficiencies and conditions detrimental to the proper completion of this work. Beginning work means that the Contractor accepts substrates, previous work, and conditions. The Contractor shall not place any planting soil mixtures until all work in adjacent areas is complete and accepted by the Commissioner.
- B. Examine the areas and conditions where structural soil is to be installed and correct any condition detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work. The installer shall examine previous work, related work, and conditions under which this work is to be performed and notify the Contractor in writing of all deficiencies and conditions detrimental to the proper completion of this work. Beginning work means installer accepts substrates, sub grades, previous work, and conditions.

3.02 PERCOLATION TEST

- A. Contractor to perform percolation test after digging planting trench to the appropriate depth and prior to placing any soil mixtures.
- B. A percolation test shall be conducted by performing the following steps in sequence:
 - 1. Prepare a test hole located within the proposed planting area. The test hole shall have a diameter of 12 inches, as precisely as possible, with vertical

- sides 18 inches deep not including any allowable liners or filter layers on either the bottom or sides.
2. Establish a fixed point at the top or bottom of the test hole from which all measurements will be taken.
 3. Scratch the bottom and sides of the test hole to remove any smeared soil surfaces, taking care not to significantly change the dimension of the hole. Add two inches of coarse sand to protect the bottom from scouring, or insert a board during the filling operation. A mesh or perforated liner designed to maintain the test hole dimensions in extremely loose soils while allowing essentially unrestricted flow may be used with permission of the Commissioner.
 4. Carefully fill the hole with clear water to a minimum depth of 12 inches from the bottom of the hole. Maintain the minimum 12-inch or greater water level by adding water as necessary in order to saturate surrounding soils for a period of no less than 15 minutes after filling the hole.
 5. After saturation, if the water level drops to a depth of nine inches in fewer than 30 minutes, measure the length of time in minutes for it to drop from a depth of nine inches to a depth of six inches. If the rate is erratic in the opinion of the Commissioner, the hole shall be refilled and soaked until the proper increment of depth of six inches, divided by three, is the percolation rate in minutes per inch.
 6. If the initial three-inch drop requires more than 30 minutes (rate equal to more than ten minutes per inch), the soil shall be saturated by filling the hole to the top and maintaining it full for at least four hours. The soil should then be permitted to swell a minimum of 12 hours so that the conditions will approach those that exist during the wettest season of the year. After the 12-hour swelling period, the test shall be made again by filling the hole to a 12-inch depth and maintaining between nine inches and six inches. The time elapsed between nine inches and six inches, divided by three, shall be the percolation rate.
 7. In certain soils, particularly coarse sands, the soil may be so pervious as to make a percolation test difficult, impractical, and meaningless. At the discretion of the Commissioner with the concurrence of the approving authority, the percolation test may be discontinued and a rate of two minutes per inch or less can be assumed provided that at least 24 gallons of water has been added to the percolation hole within 15 minutes and it is impossible to obtain a liquid depth of nine inches.
 8. Should the test fail, notify the Commissioner.

3.03 PACKING, LOADING AND STORAGE

- A. Site Storage: There is limited storage on site. Refer to Item 1.07 of this Section.

3.04 SITE PREPARATION

- A. Do not proceed with the installation of the CU- Structural Soil TM material until all walls, curb footings and utility work in the area have been installed. For site elements

dependent on CU- Structural Soil TM for foundation support, postpone installation until immediately after the installation of CU – Structural Soil TM.

- B. Install subsurface drain lines if required as shown on the Drawings prior to installation of CU-Structural TM material.
- C. Excavate and compact the proposed subgrade to depths, slopes, and widths as shown on the drawings. There should be excavation to allow a minimum depth of 24" and preferably 36" of CU-Standard Soil TM prior to any base material or pavement to be added on top of it. Maintain all required angles of repose of the adjacent materials as shown on the drawings. Do not over excavate compacted subgrades of adjacent pavement or structures.
- D. Confirm that the subgrade is at the proper elevation and compacted as required. Subgrade elevations shall slope parallel to the finished grade and/or toward the subsurface drain lines as shown on the drawings. Do not excavate tree planting trench to a depth greater than required; the subgrade below the rootball shall be tamped slightly to prevent settlement.
- E. Clear the excavation of all construction debris, trash, rubble and any foreign material. In the event that fuels, oils, concrete washout silts or other material harmful to plants have been spilled into the subgrade material, excavate the soil sufficiently to remove the harmful material. Fill any over excavation with approved fill and compact to the required subgrade compaction.
- F. Do not proceed with the installation of CU-Standard Soil TM until all utility work in the area has been installed. All subsurface drainage systems shall be operational prior to installation of CU-Standard Soil TM.
- G. Protect adjacent walls, walks and utilities from damage or staining by the soil. Use ½" plywood and/or plastic sheeting as directed to cover existing concrete, metal and masonry work and other items as directed during the progress of the work.
 - 1. Clean up all trash and any soil or dirt spilled on any paved surface at the end of each work day.
 - 2. Any damage to the paving or architectural work caused by the soils installation Contractor shall be repaired by the general Contractor at the soils installation Contractor's expense.
- H. Maintain all silt and sediment control devices required by applicable regulations. Provide adequate methods to assure that trucks and other equipment do not track soil from the site onto adjacent property and the public right of way.

3.05 INSTALLATION OF CU-STRUCTURAL SOIL TM MATERIAL

- A. See Item 3.06 Installation of Trees for description of simultaneous placement of trees with soil.
- B. Install CU-Structural Soil TM in 6 inch lifts and compact each lift.

- C. Compact all materials to peak dry density from a standard AASHTO compaction curve (AASHTO T 99). No compaction shall occur when moisture content exceeds maximum as listed herein. Delay compaction 24 hours if moisture content exceeds maximum allowable and protect CU-Structural Soil TM during delays in compaction with plastic or plywood as directed by the Engineer. Do not use harsh cleaning materials or methods that would damage finish.
- D. Bring ^{CU}-Structural Soil TM to finished grades as shown on the Drawings. Immediately protect the CU-Structural Soil TM material from contamination by toxic materials, trash, debris, water containing cement, clay, silt or other materials that will alter the particle size distribution of the mix with plastic or plywood as directed by the Commissioner.
- E. The Engineer may periodically check the material being delivered and installed at the site for color and texture consistency with the approved sample provided by the Contractor as part of the submittal for CU-Structural Soil TM. In the event that the installed material varies significantly from the approved sample, the Commissioner may request that the Contractor test the installed CU-Structural Soil TM. Any soil which varies significantly from the approved testing results, as determined by the Commissioner, shall be removed and new CU-Structural Soil TM installed that meets these specifications.

3.06 INSTALLATION OF TREES

A. Notification and Inspection:

- 1. If any new tree pits have to be cut, a permit must first be obtained from the Department of Transportation. A permit shall be required for each block where the pavement is broken for a new pit. The Contractor is also responsible for notifying all owners/operators of underground facilities (code 753). Owners/operators of underground facilities include but are not limited to Keyspan, Con Edison and telephone authorities. Code 753 notifications are to be made to the NYC/LI On Call Center, Briarwood Plaza, Suite 202, 36-35 Bell Boulevard, Bayside, NY 11361. Telephone No. 1-800-272-4480. A code 753 number must be obtained before any work can begin.
- 2. No pits shall be dug until proposed locations have been marked on the ground by the New York Department of Parks + Recreation staff and examined by the Contractor to insure compliance with all City, State and Utility regulations. The Contractor will then take full responsibility for the tree pit locations. All excavated materials shall be removed from the site and disposed of by the Contractor. The area is to be made safe and secure at the end of the workday.

- B. Tree Staking and Layout: Layout and stake individual trees, obtain Commissioner's acceptance of location, and finish grade elevation prior to installation. After staking is accepted, place trees for final review and acceptance by Commissioner.

- C. The Contractor shall remove all materials from the tree pit for the full length and width of the tree pit to the depth of the tree's root ball. Extreme care shall be taken not to excavate to a depth greater than required. The sub grade below the root ball shall be tamped slightly to prevent settlement.
- D. All excavated materials shall be removed from the site and disposed of by the Contractor. All tree pits are to be closed and filled with topsoil or backfill and made level with existing conditions. Area is to be made secure and safe at the end of work day.
- E. Tree Placement: Place balled and burlapped material in the prepared planting pit by lifting, and carry it by the root ball so that the ball will not be loosened. Set the tree straight and in the center of the pit. All trees shall set, after settlement, at the level of the base of the trunk and the beginning of the roots known as the "trunk flare". If the top of the root ball is not consistent with this area, soil will be added or removed to make it so, and the depth of the planting site adjusted accordingly. Care shall be exercised in setting the trees plumb. Cut and remove rope or wire from the top fifty percent of the root ball. Cut and remove burlap from the planting pit.
- F. Expose Root Ball: Remove as much woven product and twine as possible. All plastic or synthetic fabric must be removed from the ball at the time of planting. Any wire basket enclosed root ball will need to have at least 2/3 of the wire basket cut away from the side and top of the ball, and removed from the site. Remaining lateral wires must be cut to prevent future root interference. Wire must not be galvanized or aluminum wire. At least fifty percent of the burlap shall be removed, and the remaining burlap pulled back and adjusted to prevent the formation of air pockets. All ropes, stones, etc. shall be removed from the planting site before backfilling.
- G. Adhesives: Mycorrhizal inoculants and water retention additive shall be added after the trees have been placed in their hole. Open three packets for each 2 1/2" -3" caliper tree and thoroughly mix the inoculants into the upper 6-8 inches of the backfill mix. One packet (3 ounces) is to be used per 1" caliper. Each tree shall receive 3 ounces of water retention additive, or the amount specified by product instructions. Half should be added at a depth of 8-10 inches and the other half just below the finished surface.
- H. Backfilling: Backfilling mixture shall be loose and friable, and not frozen. Soil shall be firmed at six to eight inch intervals and thoroughly settled with water.
- I. The Contractor shall cultivate and rake over finished planting areas and shall leave them in an orderly condition. On level ground or slight slopes, a shallow basin a little larger than the diameter of the tree ball shall be left around each tree. At no time should topsoil be mounded to cover the trunk of the tree. Final soil level, except for the shallow basin, shall be flush with the surrounding sidewalk grade to prevent potential tripping hazard.
- J. Tree Wrap: No tree trunks shall be wrapped. Remove all nursery tags and protective wrapping.

- K. Staking: All staking shall be done during planting operation and shall be maintained throughout the first year of the two-year guarantee period.
1. Stake shall be placed a minimum distance of one (1) foot away from the trunk of the tree, taking care to stay clear of the roots, driven thirty (30) inches into the ground, and shall be fastened to the tree with doubled No. 12 gauge annealed galvanized steel wire run through a suitable length (at least twelve (12) inches) of new reinforced one-half (1/2") inch black rubber hose.
 2. Unless otherwise directed, trees shall be staked as shown on the plans and in accordance with these specifications. Stakes shall be set parallel to curbs. The length of doubled wire between the tree and stakes shall be hand twisted several times prior to fastening to the stakes. The wires shall be tied off firmly at the stake, not crank twisted at the center. Trees shall stand plumb after staking.
 3. Stakes, wires, and hoses shall be removed at the end of the first year of the two year guarantee period, unless directed otherwise directed by the Commissioner. At the time the stakes are removed any holes left by the stake shall be filled with topsoil of the same quality as that specified in this section.
- L. Pruning: Only crossing, broken or badly bruised branches shall be removed. These shall be pruned with a clean cut.
1. All pruning shall be done with sharp pruning tools. At the time of planting, pruning cuts shall be made at the base of the branch at such a point and angle that neither the branch collar nor the bark of the stem is damaged, and that no branch stub extends from the collar. Crowns of young trees shall not be cut back to compensate for root loss. No leaders shall be cut.
- M. Watering: At the time of planting, the soil around each tree shall be thoroughly saturated with at least twenty gallons of water. Soil shall be firmed at six to eight inch intervals and thoroughly settled with water. Water shall be free from oil, have a pH neither less than 6.0 nor greater than 8.0, and shall be free from impurities injurious to vegetation. Unless otherwise directed, water may be drawn from mains owned by or supplying water to the City of New York.
1. Water shall not be applied in a manner which damages plants, plant saucers, stakes or adjacent areas. Each plant saucer shall be carefully filled with water in a manner which does not erode the soil or the plant saucer. Watering shall not cause uprooting or exposure of plant's roots to the air.
- N. Mulching: Bark Mulch shall be applied as a ground cover to the surface of all planting beds at the time of planting and again after the tree stakes have been removed, one year after planting. Bark Chip Mulch shall be natural forest product of 98% bark containing less than 2% wood or other debris. It shall be of White or Red Fir and/or Pine bark of a uniform grade with no additives or any other treatment. Size of bark shall be from 5/8" to 1-1/4". The pH factor should range from 5.8 to 6.2. Mulch shall be applied to a uniform depth of three (3) inches and shall be so distributed as to create a smooth, level cover over the exposed soil. A

gap of approximately 2" should be left between the mulch and the trunk of the tree to avoid mounding above the trunk flare.

3.07 FINISHING

- A. Installation of Ground Cover Planting: Refer to Section 329300 Planting Materials and Plants for materials and installation.
- B. Installation of granite cobblestone pavers: Refer to Section 321400 Unit Paving.

3.08 CLEANING, PROTECTION, AND EXCESS MATERIAL

- A. Clean pavements and keep work areas clean and neat during landscape work. Remove all debris from site.
- B. Provide temporary protection, as specified and as needed, to protect drainage system, restrict traffic, and permit growth to develop, to protect completed work, and to ensure work is without damage or deterioration at time of final acceptance.
 - 1. Protect existing and newly installed drainage system at all drain inlets to prevent silt, materials, or debris caused by planting operations from entering the drainage system.
- C. Excess Planting Soil Mixture and Materials: remove excess soil and materials from the site at no additional cost to the Commissioner.
- D. Tags: Remove all identification labels, trunk wrap, seals and tags at final acceptance of the project.

3.09 ACCEPTANCE OF STANDARDS

- A. The contractor shall notify the Commissioner when the work is complete for inspection purposes. Request for inspection shall be received by the Commissioner at least 10 days before the anticipated date of inspection.

END OF SECTION

THIS PAGE INTENTIONALLY LEFT BLANK

SECTION 33 46 00

NON-WOVEN GEOTEXTILE AND COMPOSITE DRAINAGE BOARD

PART 1 – GENERAL

1.1 SUMMARY

- A. This section describes the installation of the non-woven geotextile and composite drainage panels that are to be furnished and installed as part of this project.
- B. Under these Items, the Contractor shall furnish and install non-woven geotextile and composite drainage panels to separate landscape materials in accordance with the plans and specifications, as directed by the Engineer.
- C. Related Sections:
 - a. Construction Waste Management and Disposal - Section 017419
 - b. Sustainable Design Requirements (LEED Building) - Section 018113
 - c. Volatile Organic Compound (VOC) Limits for Adhesives, Sealants, Paints and Coatings - Section 018113.3
 - d. Construction IAQ Requirements - Section 018119

1.2 PERFORMANCE REQUIREMENTS

- A. LEED BUILDING - GENERAL REQUIREMENTS:

The City of New York requires the Contractor to implement practices and procedures to meet the project's environmental goals, which include achieving a LEED™ Green Building rating. Specific project goals which may impact this area of work are listed in the applicable paragraphs of this specification section. The Contractor shall ensure that the requirements related to these goals, 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, shall not be allowed if such changes compromise the stated LEED BUILDING criteria.

PART 2 – PRODUCTS

2.1 MATERIALS

- A. All non-woven geotextile and composite drainage panels shall be synthetic and rot proof. It shall be manufactured for the purpose of separating two different materials.
 - 1. Definition: Separation application is defined as the placement of a flexible porous geotextile between dissimilar materials so that the integrity and functioning of both materials can be maintained or improved.
 - 2. Non-woven geotextile used in separation applications shall be AEF 300 W as manufactured by AEF, FX66 manufactured by Carthage Mills, or 160N as manufactured

12/21/2012

by Mirafi, Inc. or approved equal. Non-woven geotextile used shall conform to the following AASHTO-M-288 properties for separation geotextiles:

	ASTM TEST	TYPE
Structure		Non Woven
Elongation	D4595	$\geq 50\%$
Grab Strength	D4632	700N (157LBF)
Tear Strength	D4533	250N (56LBF)
Puncture Strength	D4833	250N (56LBF)
Permittivity	D4491	.02 1/sec. min.
Apparent Opening Size	D4751	.6 mm max.

3. Composite drainage board shall be AMERDRAIN 200/220 as manufactured by American Wick Drain Corporation, Ultra-Shield Sheet Drain 200/220 as manufactured by GMX, Inc., or J-DRain 200/220 as manufactured by JDR Enterprises, Inc., or approved equal.
- B. Submittals: All submittals shall be submitted in accordance with the requirements of the contract. The Contractor shall submit the following for the Engineer's review and approval prior to purchase.
1. Manufacturer's Data: The Contractor shall submit manufacturer's data with sufficient detail to demonstrate compliance with the requirements of this specification.
 2. Samples: The Contractor shall furnish the required number of samples of the non-woven geotextile and composite drainage board intended for use in the work for approval and the Engineer's use. The label shall include the manufacturer's product name, the type of fabric, and the weight of grade of the material. Non-woven geotextile and composite drainage board used in the work shall conform to the approved samples.

PART 3 – EXECUTION

3.1 Delivery, Storage and Handling:

1. Delivery: Deliver materials to site in manufacturer's original, unopened packaging, with labels clearly identifying product name and manufacturer.
2. Storage: Store materials in clean, dry area in accordance with manufacturer's instructions.
3. Handling: Protect materials during handling and installation to prevent damage.

3.2 Examination:

1. Examine subgrade areas to receive non-woven geotextile. Notify Engineer if areas are not acceptable. Do not begin installation until unacceptable conditions have been corrected.

3.3 Installation:

1. Install non-woven geotextile in accordance with manufacturer's instructions at locations indicated on the Drawings.
2. The non-woven geotextile shall be rolled directly on the ground. All seams shall be overlapped approximately six (6") inches.
3. No equipment, materials or machinery shall be placed on or be transported over exposed geotextile.
4. Top soil as shown on the plans and as directed by the Engineer shall then be carefully placed to prevent dislocation of the fabric. If the fabric is damaged during installation, the rupture shall be removed and the damaged area shall be covered with a patch of new fabric that will overlap the undamaged fabric approximately six (6") inches in all directions. All repaired fabric surface costs will be deemed part of the price bid.

END OF SECTION 33 46 00

THIS PAGE INTENTIONALLY LEFT BLANK

15 December 2005

Mr. Mark Morrison
Mark K. Morrison Associates Ltd.
242 West 30th Street, Suite 403
New York, NY 10001

**Re: Geotechnical Investigation
Contract X288-102M
Reconstruction of Bronx River Park
– East 180th Street to East Tremont Avenue
Bronx, NY
Langan Project No. 5649301**

David T. Gockel, P.E., P.P.
George E. Derrick, P.E.
George P. Kelley, P.E.
Michael A. Semeraro, Jr., P.E.
Nicholas De Rose, P.G.
Andrew J. Ciancia, P.E.
George E. Leventis, P.E.
Rudolph P. Frizzi, P.E.
Ronald A. Fuerst, C.E.A.

Roger A. Archabal, P.E.
Gregory L. Biesiadecki, P.E.
Gerard M. Coscia, P.E.
Colleen Costello, P.G.
Michael E. Cotreau, P.E.
Gregory M. Eiko, P.E.
Michael M. Goldstein
Cristina M. González, P.E.
Sam B. Ishak, M.C.S.E.
William G. Lothian, P.E.
John J. McElroy, Jr., Ph.D., P.E.
John D. Planie, P.E.
Alan R. Poeppel, P.E.
Joseph E. Romano, P.L.S.
Leonard D. Savino, P.E.
Steven Ueland, P.E.
Gerald J. Zambrelli, C.E.M.

Jorge H. Berkowitz, Ph.D.
Richard Burrow, P.E.
David J. Charette, P.W.S.
Steven Ciambuschini, P.G., L.E.
Daniel D. Disario, P.E.
Edward H. Geibler, M.S.
Christopher M. Hager, P.E.
Joel B. Landes, P.E.
Matthew E. Meyer, P.E.
R. S. Murali, M.S.
Richard R. Steiner, P.E.

Dear Mr. Morrison:

We are pleased to submit this letter report presenting the results of our geotechnical investigation for the above referenced project. The purpose of this investigation was to determine the of the subsurface soil condition, and provide geotechnical design recommendations for the proposed work. A summary of our findings and our preliminary recommendations are presented herein.

SITE AND PROJECT DESCRIPTION

The project site comprises an existing recreational park and walkway that runs along the west bank of the Bronx River between East 180th Street and East Tremont Avenue in the Borough of Bronx, New York. A site location map is presented in Figure 1.

The site is presently occupied by a 4 ft wide asphalt walkway, trees and shrubs, and a playground. The Bronx River Arts Center (Arts Center) borders the park and is located towards the southern end of the park. There is an existing brick retaining wall at the playground that is to be demolished. There is also an existing "retaining wall" constructed of tires that runs along part of the river bank in the vicinity of the Arts Center that will be removed and replaced by a

new wall/ stabilized embankment. The site also has a low level bridge that carries subway lines over the river, and is adjacent to the Arts Center. These structures are shown in Figure 1.

The general topography of the site slopes down from west to east (towards the Bronx River) and ranges in elevation from about el+17 to el+3 Borough President of Bronx Datum (BPBD)¹. The existing topographic information is based on the site survey prepared by Langan Engineering dated March 2005.

The proposed development consists of the reconstruction of the park including a new walkway and water edge treatment. The work will include the construction of a new retaining wall along the walkway from East 180th Street, south, to the existing playground area, and a new embankment/wall along the river near the Arts Center to replace the tires. Other work in the park will include the removal and replacement of the existing lighting and also the construction of a new water fountain.

FIELD INVESTIGATION

The field investigation consisted of drilling three borings, identified as B-1 through B-3, and excavating five test pits, identified as TP-1 through TP-5. The borings and test pits were located along the length of the park as shown in Figure 2.

Test Borings

The test borings B1 through B-3 were drilled on 21 November 2005 by Jersey Boring and Drilling using a Klemm KR 704 limited access rig. The borings were advanced to depths ranging between 8 ft and 16 ft using 3 inch O.D. hollow stem augers; boring B-3 was terminated at 8 ft due to an obstruction. A standard 2 inch O.D split spoon sampler was used to obtain soil sample. Soil samples were obtained continuously over the depth of the boring. The Standard Penetration Test (SPT) was performed as part of the sampling procedure and the SPT 'N' values were recorded by our field engineer. The borings were backfilled upon completion using drill cuttings. Boring logs are presented in Appendix A.

¹Elevations are referenced to Borough President of Bronx Datum which is 2.608 ft above the National Geodetic Vertical Datum (Mean Sea Level at Sandy Hook, NJ 1929). [BPMD=USGS-2.608]

Test Pits

The test pits TP-1 through TP-5 were excavated on 21 November 2005 by Mike's Exterior Contracting Corp. using a small rubber-tracked excavator. The test pits were excavated to investigate; (1) the existing tire "retaining wall", (2) the type and condition of the foundation of the Arts Center, and (3) the general soil conditions. Once the excavations were complete, the test pits were inspected by a Langan engineer who produced sketches and field-classified representative soil samples according to the NYCBC. Photographs of the test pit excavations are presented in Appendix B.

Test pits TP-1 and TP-2 were excavated between the Arts Center and the tire retaining wall along the river. The pits were approximately 3 ft wide by 8 ft long; the excavation was stopped at about 8 ft below ground surface (el -1). An illustration of the typical conditions encountered in test pits TP-1 and TP-2 is presented in Appendix B.

Test pit TP-3 was excavated in the vicinity of the playground adjacent to the walking path. The pit was approximately 3 ft wide by 6 ft; the excavation was stopped at about 8 ft below ground surface (el +1).

Test pit TP-4 was excavated just off of the walking path, about 130 ft south of the park entrance on E 180th Street. The pit was approximately 3 ft wide by 6 ft long; the excavation was stopped at about 8 ft below ground surface (el +7).

Test pit TP-5 was excavated at the location of boring B-3 to investigate the nature of the obstruction encountered during drilling. The pit was approximately 3 ft wide by 5 ft long; the excavation was stopped at about 8 ft below ground surface (el +10).

SUBSURFACE CONDITIONS

The subsurface materials encountered in the borings and test pits consisted of fill material overlying fine to coarse sands. Soft silty clay was encountered in test pits TP-1 and TP-2. The subsurface conditions are described in more detail below.

Fill Material [11-65]

Fill material was encountered in all borings and test pits. The fill generally consisted of silty coarse to fine sand with varying amounts of brick, cobble and boulder sized rock fragments, steel, and garbage. Roots and other organic material were observed in this layer. Test pit TP-5 revealed a high concentration of cobble and boulder sized rock fragments throughout the depth

of this excavation. The presence of the cobbles and boulders explains the difficulty in drilling boring B-3.

The fill extended to depths ranging from 6 ft to 12 ft below ground surface. SPT N values in the fill layer ranged from 6 to over 100 blows/ft, with an average N value of 23 blows/ft.

Sand [7-56 & 8-65]

Underlying the fill material in borings B-1 and B-2 was a gray-brown coarse to fine sand with varying amounts of silt and gravel fragments. This layer was encountered at depths of 12 ft (el +3) and 9 ft (el +4) in B-1 and B-2 respectively. Both borings were terminated in this layer. SPT N values in the sand layer ranged from 19 to over 100 blows/ft. indicative of highly variable material. This layer was not encountered in any of the test pits.

Silty Clay [10-65]

Excavation for test pits TP-1 and TP-2 revealed a layer of soft black silty clay. This layer was encountered at depth of 6 ft (el +1) in both excavations. The silty clay is likely to be river sediment. Both excavations were terminated in this layer due to collapse of the pits under the inflow of groundwater. This layer was not encountered in any of the other test pits or borings performed north of this area.

Groundwater

Groundwater was observed in test pits TP-1 and TP-2 at about 7 ft below ground surface (about el 0). Groundwater was not observed in any of the other test pits. Groundwater was indirectly observed during soil sampling in borings B-1 and B-2 at about 12 ft and 10 ft below ground surface (el+3).

Groundwater levels can be expected to be at about the level of the Bronx River in this area.

EXISTING STRUCTURES

Arts Center

Test pits TP-1 and TP-2 were excavated across the existing path between the tire retaining wall and the Arts Center, exposing the Art Center foundation. The foundation of the Arts Center consists of stacked stone blocks that extend downward from the existing grade to a depth of about 6 ft. The stone footing steps out about 6 inches from the face of the building at this depth and extends down by another foot and stops at about 7 ft below ground surface (el 0).

Tire "Wall"

The tires that form the retaining wall along the bank of the river were observed in test pits TP-1 and TP-2. The tires have been placed in horizontal layers and filled with soil and rubble to form the embankment. The tires were observed throughout the depth of the excavation (8 ft). The bottom of the tire "wall" could not be determined due to collapse of the excavations and inflow of groundwater.

RECOMMENDATIONS

The following provides our preliminary recommendations for the new walking path retaining wall and removal and replacement of the existing tire wall. Other geotechnical related design parameters for sub-grade preparation, backfill and compaction, and wall drainage are also presented.

Once the retaining wall type has been finalized, we can provide design drawings and construction specifications addressing retaining wall construction requirements; we would be pleased to provide a proposal if requested.

Walking Path Retaining Wall

We have reviewed the proposed line of the retaining wall along the walking path. The maximum retained height is expected to be about 5 ft. We have considered two solutions that could be utilized in the design and construction of the walking path retaining wall.

1. Mechanically Stabilized Earth (MSE) Wall

A mechanically stabilized earth wall uses geo-grid products to reinforce the soil and modular block facing units. These walls are attractive and can be easily constructed in the curved alignment currently envisioned. However, this option is likely the more expensive of the two choices. A diagram of a typical MSE wall is presented in Figure 3.

Construction will involve the excavation of the existing fill to a depth of about 8 ft behind the wall to facilitate the installation of the geo-grids. Backfilling behind the wall with granular soil and geo-grids proceeds as the wall is built higher. The existing fill should be sorted to remove roots, large rock fragments and other unsuitable materials prior to reuse as backfill. The existing fill may not be suitable (organics, clay/silt, debris) and additional granular fill may be required. Unsuitable material must be properly disposed off site.

2. Gabion Wall

A gabion wall is constructed from wire mesh baskets that are filled with angular cobble sized rock. Such walls are simple and quick to construct and can be readily built to the curved alignment proposed. The walls are flexible and free draining and require minimal maintenance. A gabion is not as "attractive" as a MSE wall, however the wall could likely be landscaped if desired to hide the wall. A diagram of a typical gabion wall is presented in Figure 4.

We feel that a gabion wall would provide a simple and cost effective solution with a relatively natural looking finish. However, if a more "finished" hardscape look is desired, the MSE wall can be used for a cost premium. Either wall option should require minimal maintenance.

Presuming that the on-site soils are approved and utilized for backfill behind the gabion wall, we recommend the following design parameters to be used in design. This assumes the retaining wall backfill meets the minimum requirements for approved compacted fill discussed below.

Unit Weight of Soil γ (pcf)	Friction Angle ϕ	Active Earth Pressure Coefficient (K_a)	Passive Earth Pressure Coefficient (K_p)
120	32°	0.31	3.25

A gabion wall is free draining and hydrostatic pressures are unlikely to develop behind the wall provided the spaces between the rocks is maintained and prevented from becoming blocked with soil. A geo-fabric should be placed behind the wall between the soil backfill and the wall to prevent the migration of soil into the void spaces. An MSE wall should be designed with a drainage "chimney" at the back of the reinforced zone with a drain pipe and weep holes in the face of the wall. The designer should allow for a minimum surcharge load of 250 psf, and should consider higher surcharges if heavy vehicle access (fire trucks or construction equipment) is anticipated.

Tire Retaining Wall

We understand that the existing tire retaining wall will be removed or aesthetically improved as part of the project. A diagram showing the typical existing conditions is presented in Figure 5. The following discusses several issues and preliminary options for the work.

Complete removal of the tire wall would require temporary diversion of the Bronx River and dewatering to provide a relatively dry working area. Further, the silty clay material at the base of

the tires is sensitive to exposure to water. If the clay is exposed to water it will further soften and result in difficulties constructing a replacement wall. The stability of the cut slope excavation could also affect the stability of the existing Arts Center building foundations. Therefore, we advise against complete removal of the tires.

We recommend that the new water edge treatment consist of a "flexible" slope or wall. A "flexible" design will allow settlement without structural damage or loss of stability. This could be accomplished by a rip-rap slope or gabion wall. In general, a slope would be the least expensive.

We recommend leaving a portion of the tire wall in-situ and improving the aesthetics by covering it with a rip-rap slope or gabion wall. Both options provide a more natural appearance and can be planted to hide the material further. A sketch illustrating partial replacement by a rip-rap slope is presented in Figure 6; a sketch illustrating partial replacement by a gabion wall is presented in Figure 7. Design should be completed using the parameters provided previously.

Waterfront Permitting

Please note, the proposed tire removal and embankment/gabion construction will cause disturbance of the waterway. Langan is presently reviewing the required permits from U.S. Army Corps of Engineers (USACE) and the New York State Department of Environmental Conservation (NYSDEC). When the design of the proposed work along the river bank has been finalized, Langan will file a Joint Permit Application to USACE and NYSDEC to obtain the required permits.

Backfilling and Structural Fill

Existing fill and natural soil excavated from the site that meets the requirements/recommendations given below can be reused for structural fill and general backfill. The existing fill can be re-used after screening to remove wood, organics and other deleterious materials, and removal or crushing of cobble to boulder size materials. All fill deemed unsuitable by the onsite Geotechnical Engineer should be segregated and used in landscaped areas or disposed of off site.

Structural fill for embankments and retaining wall backfill should be placed in loose lifts not exceeding 12 inches in thickness and compacted using a minimum 5-ton static-drum- weight. Smaller compaction equipment and thinner lifts can be used in areas of limited access and maneuverability and adjacent to retaining walls. Each lift of structural fill should be compacted

to a minimum of 95% of its maximum dry density, determined in accordance with ASTM D1557, Modified Proctor Test. In landscaping areas, the compaction criteria can be reduced to 90% of the materials maximum dry density (ASTM D1557). No fill material should be placed on areas where free water is standing, on frozen subsoil areas, or on surfaces which have not been approved by the Geotechnical Engineer.

All sub-grade areas should be level and proof-rolled with at least 6 coverage's of a double drum walk behind roller, such as a Bomag BW75 or equivalent. Should any soft or unstable areas be detected by the proof-rolling, we expect the most efficient method of stabilization would be to remove the affected area and replace the excavated materials with approved soils.

In accordance with the NYCBC, the Geotechnical Engineer must perform controlled inspection of fill placement and compaction. Compaction of all fill should be verified by the Geotechnical Engineer as meeting the above criteria through visual inspection and the performance of in-place density tests (nuclear moisture-density testing). Langan would be pleased to provide this service during construction.

Groundwater Control

Groundwater may be encountered during excavation. The water should be pumped from the excavation and filtered through a silt bag before being discharged. We recommend that a turbidity curtain be placed around areas where work is being performed next to the river.

LIMITATIONS

The conclusions and recommendations given in this report are based on subsurface conditions inferred from borings and test pits at specific site locations. Recommendations given are contingent upon one another and no recommendation should be followed independent of the others. This report has been prepared to assist the Architect and Structural Engineer in the design. It is intended for use based on the provided information. Any changes in structures or locations should be brought to our attention so that we may determine how such changes may affect our recommendations.

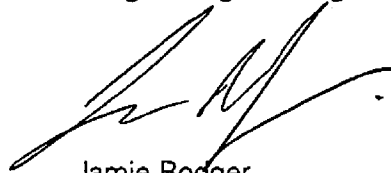
This report was produced for the proposed reconstruction of Bronx River Park (Contract X288-102M) between East 180th Street and East Tremont Avenue at Borough of Bronx, New York. Langan Engineering and Environmental Services, P.C cannot assume responsibility for the use of this report to generate geotechnical design other than those at the specific site addressed in this report.

CLOSURE

We appreciate the opportunity to work with you on this project. If you have any questions, please do not hesitate to contact our office.

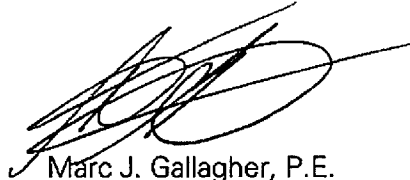
Very truly yours,

Langan Engineering and Environmental Services, PC



Jamie Rodger.

Senior Staff Engineer

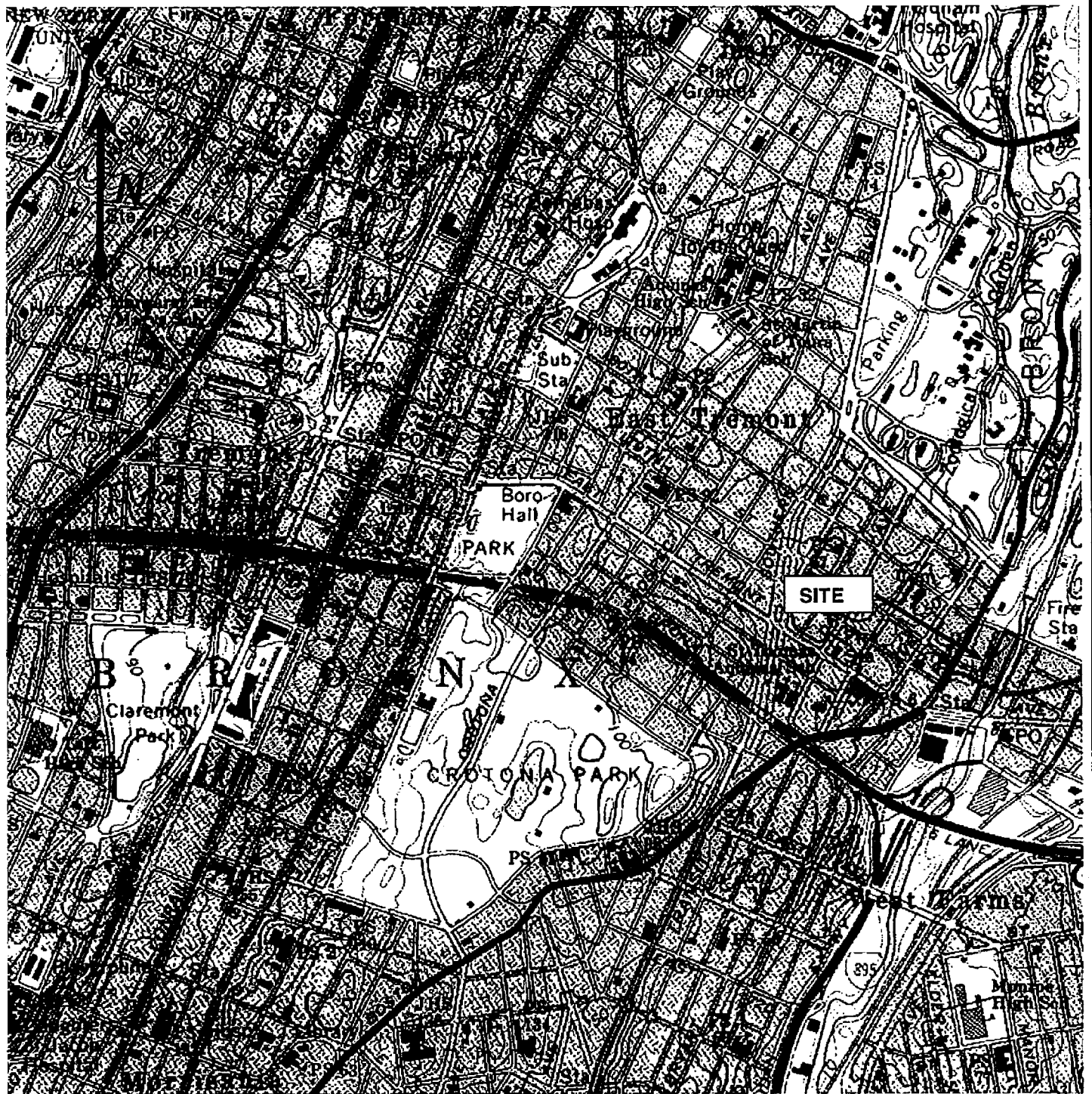


Marc J. Gallagher, P.E.

Associate

MJG:jr

U:\Data\315649301\Office Data\Reports\Geotech Letter Report.doc



Reprinted from New York USGS Quadrangle Map –Central Park



21 Penn Plaza, Suite 900
P: 212.479.5400
www.langan.com

New York, NY 10001
F: 212.479.5444

NEW JERSEY PENNSYLVANIA NEW YORK CONNECTICUT FLORIDA

The Reconstruction of Bronx River Park SITE LOCATION MAP

BRONX

PROJ. NO:

5649301

SCALE

NTS

DATE

12/01/05

NEW YORK

FIG:

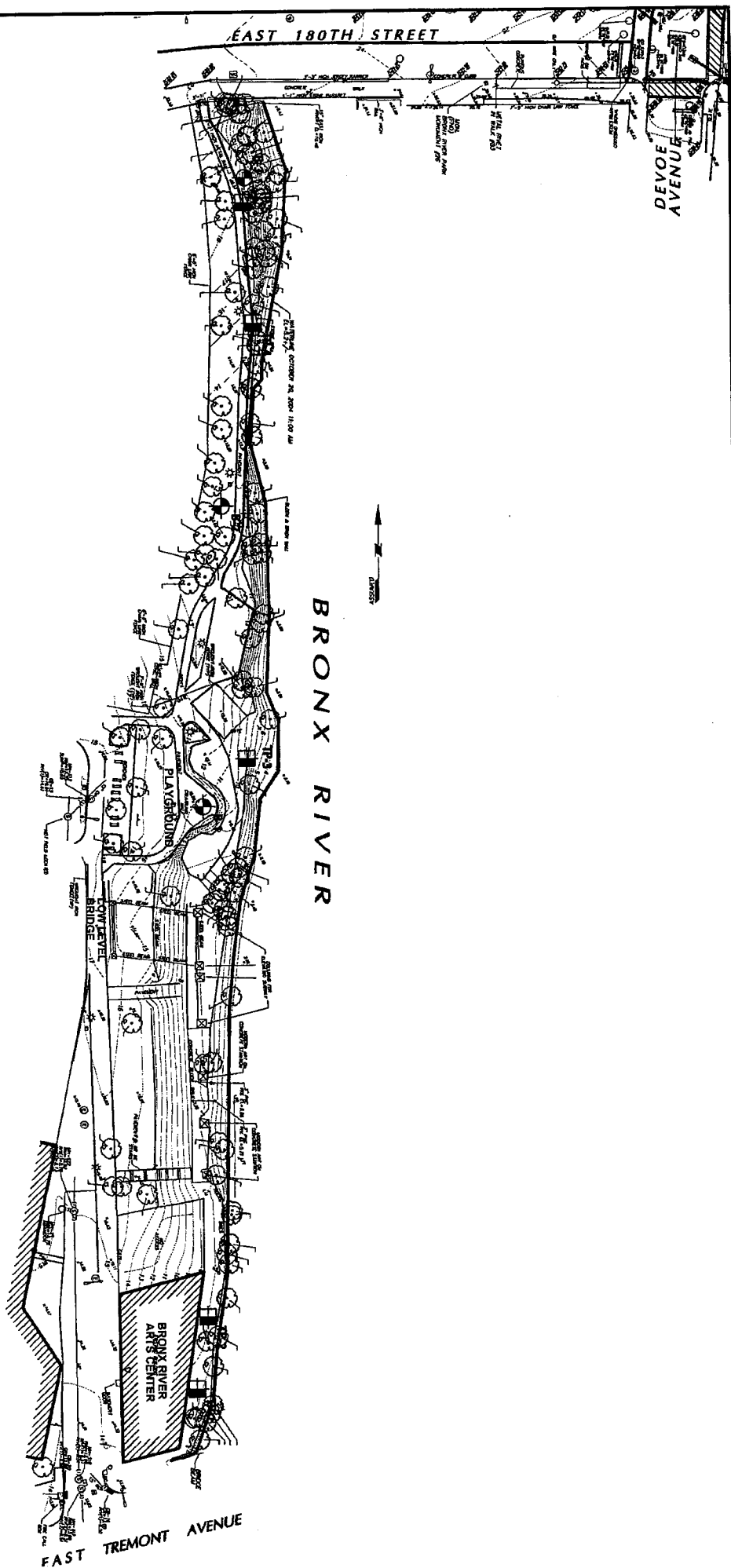
1

NOTES

1. BASE PLAN FOR BORING LOCATION PLAN WAS OBTAINED FROM SURVEY BY LANGAN ENGINEERING COMPLETED OCTOBER AND NOVEMBER 2004 AND MARCH 2005.
2. ELEVATIONS ARE REFERENCED TO BORO PRESIDENT BRONX DATUM (BPD) WHICH IS 2.608 FT ABOVE MEAN SEA LEVEL. MEASURED AT SANDY HOOK IN 1929 (NGVD).
3. BORINGS B-1 THROUGH B-3 WERE DRILLED BY CRAIG BORING AND TESTING, INC. BETWEEN 77 NOVEMBER AND 77 NOVEMBER 2005.
4. TEST PITS TP-1 THROUGH TP-4 WERE MADE BY MIKES EXTERIOR CONTRACTING CORP. BETWEEN 77 NOVEMBER AND 77 NOVEMBER 2005.

LEGEND

-  B-2 GEOTECHNICAL BORING
 TP-3 TEST PIT



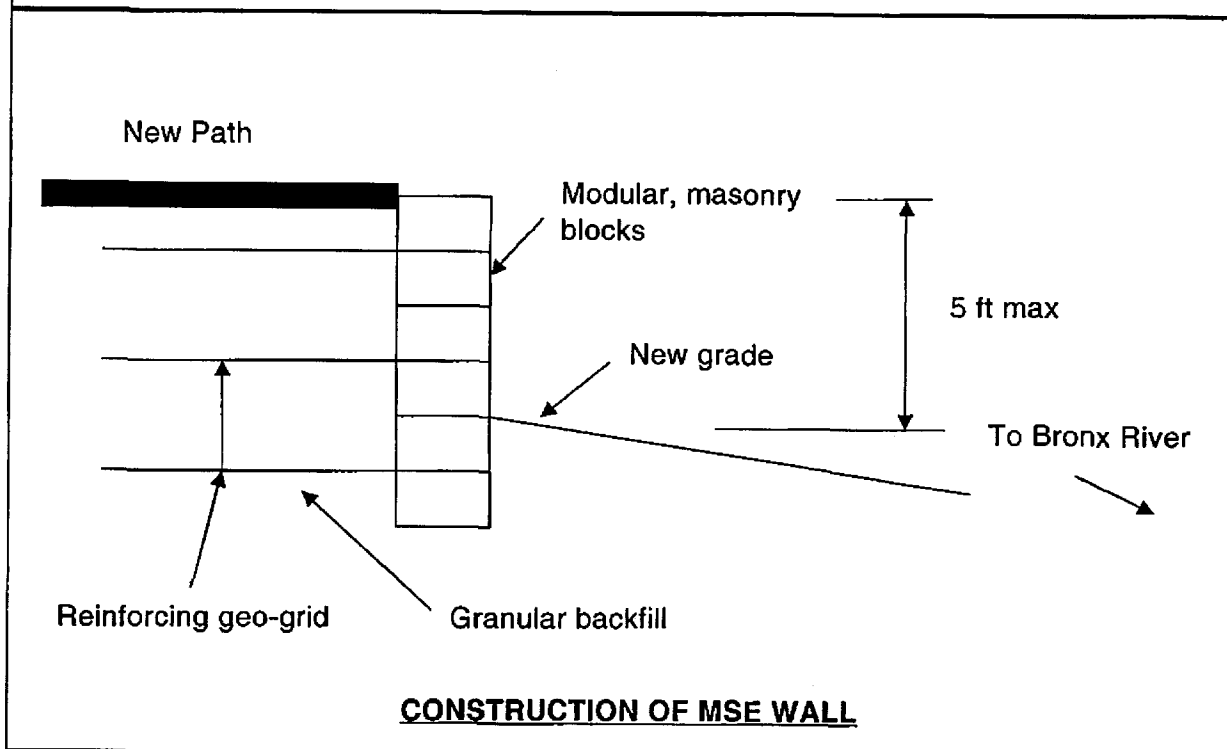
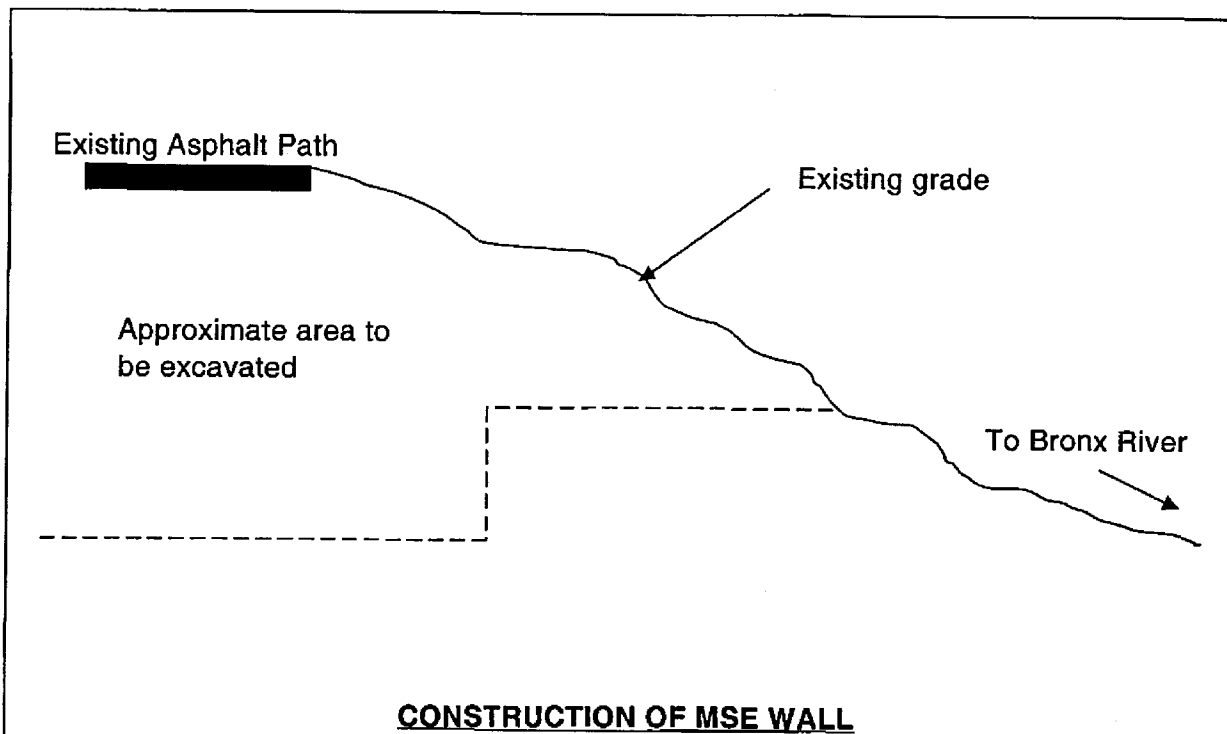
LANGAN
ENGINEERING & ENVIRONMENTAL SERVICES

21 Penn Plaza, 8th Floor
New York, NY 10001
P: 212.479.5400
F: 212.479.5444
www.langan.com

THE RECONSTRUCTION OF BRONX RIVER PARK
BORING LOCATION PLAN

BRONX
Project No. 5649301
Date 12/06/05
Scale 1" = 60'
Sheet No. 1

NEW JERSEY PENNSYLVANIA NEW YORK CONNECTICUT FLORIDA
NJ Certificate of Authorization No. 246A2798400



Schematic diagram of mechanically stabilized earth (MSE) wall.



21 Penn Plaza, Suite 900 New York, NY 10001
P: 212.479.5400 F: 212.479.5444
www.langan.com

NEW JERSEY PENNSYLVANIA NEW YORK CONNECTICUT FLORIDA

**The Reconstruction of Bronx River Park
CONSTRUCTION OF MSE WALL**

BRONX

NEW YORK

PROJ. NO:

SCALE

DATE

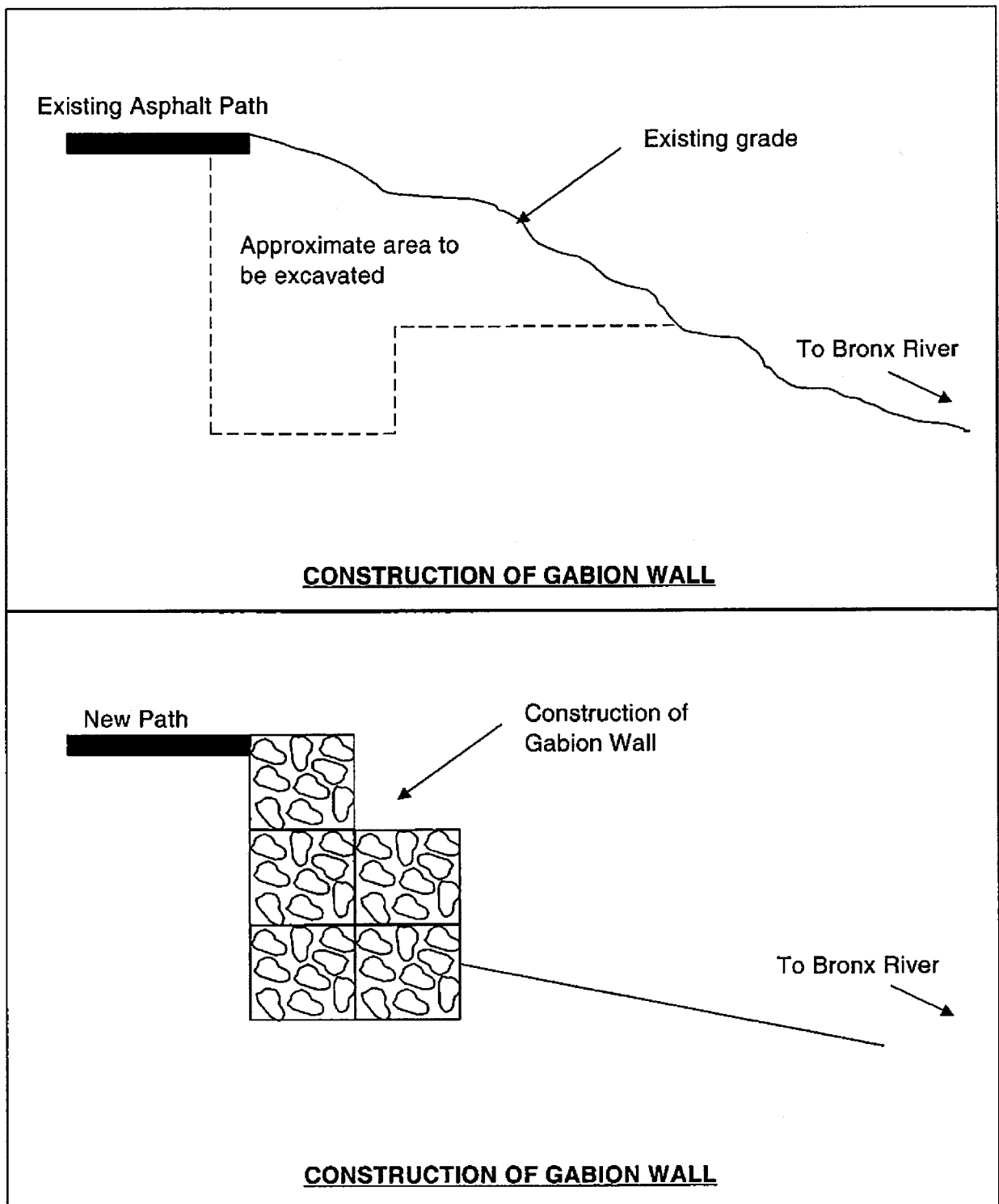
FIG:

5649301

NTS

12/01/05

3



Schematic diagram of gabion wall.



21 Penn Plaza, Suite 900 New York, NY 10001
P: 212.479.5400 F: 212.479.5444
www.langan.com

NEW JERSEY PENNSYLVANIA NEW YORK CONNECTICUT FLORIDA

**The Reconstruction of Bronx River Park
CONSTRUCTION OF GABION WALL**

BRONX

NEW YORK

PROJ. NO:

SCALE

DATE

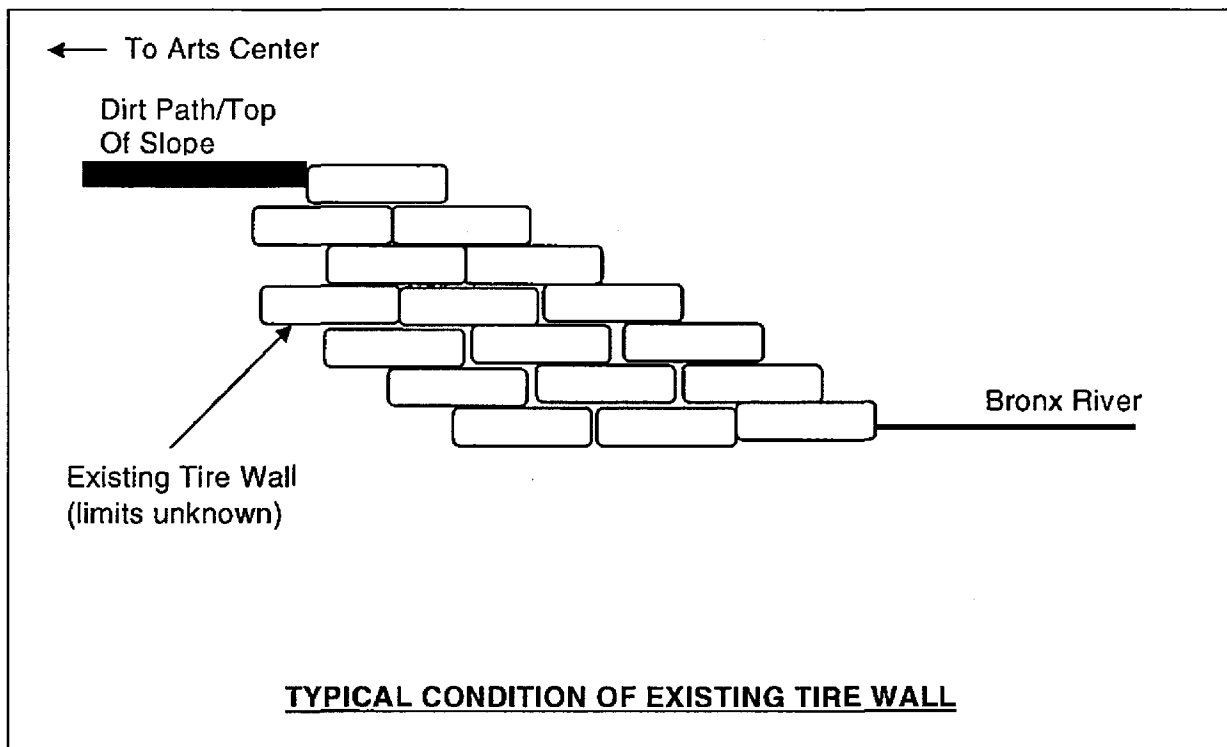
FIG:

5649301

NTS

12/01/05

4



Schematic diagram of tire wall.



21 Penn Plaza, Suite 900 New York, NY 10001
P: 212.479.5400 F: 212.479.5444
www.langan.com

NEW JERSEY PENNSYLVANIA NEW YORK CONNECTICUT FLORIDA

**The Reconstruction of Bronx River Park
EXISTING TIRE WALL**

BRONX

NEW YORK

PROJ. NO:

SCALE

DATE

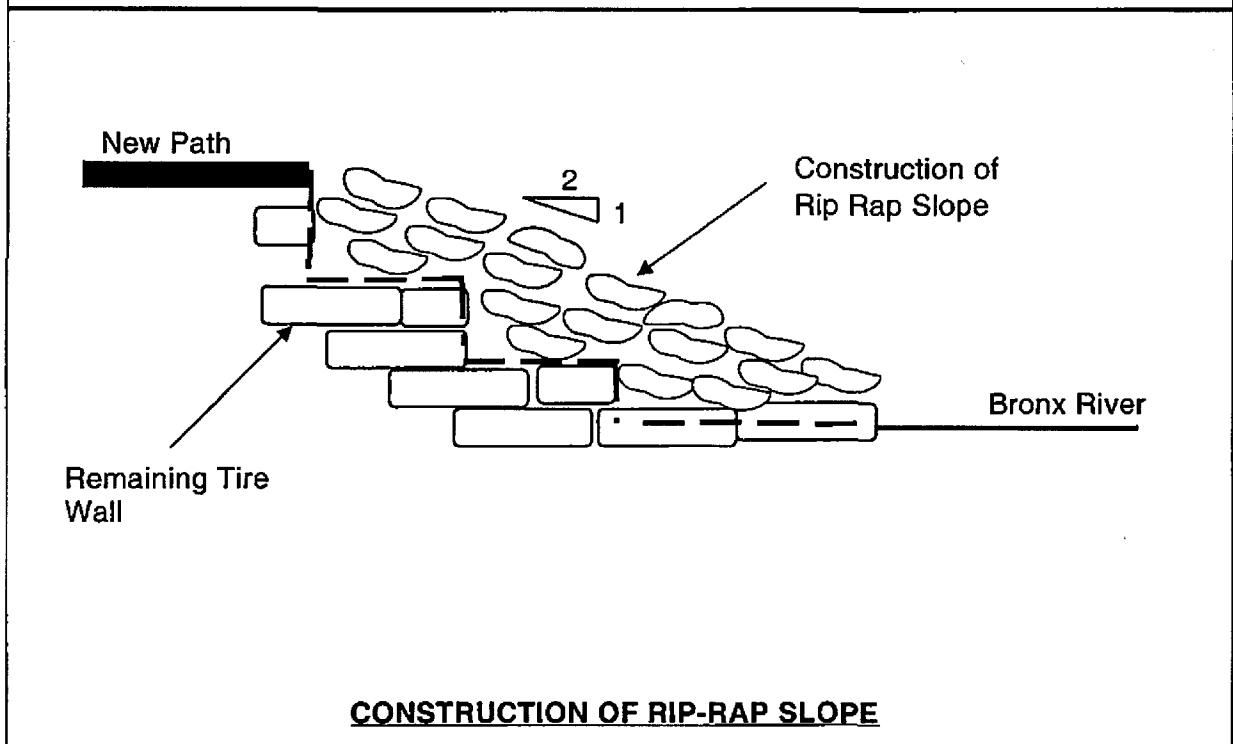
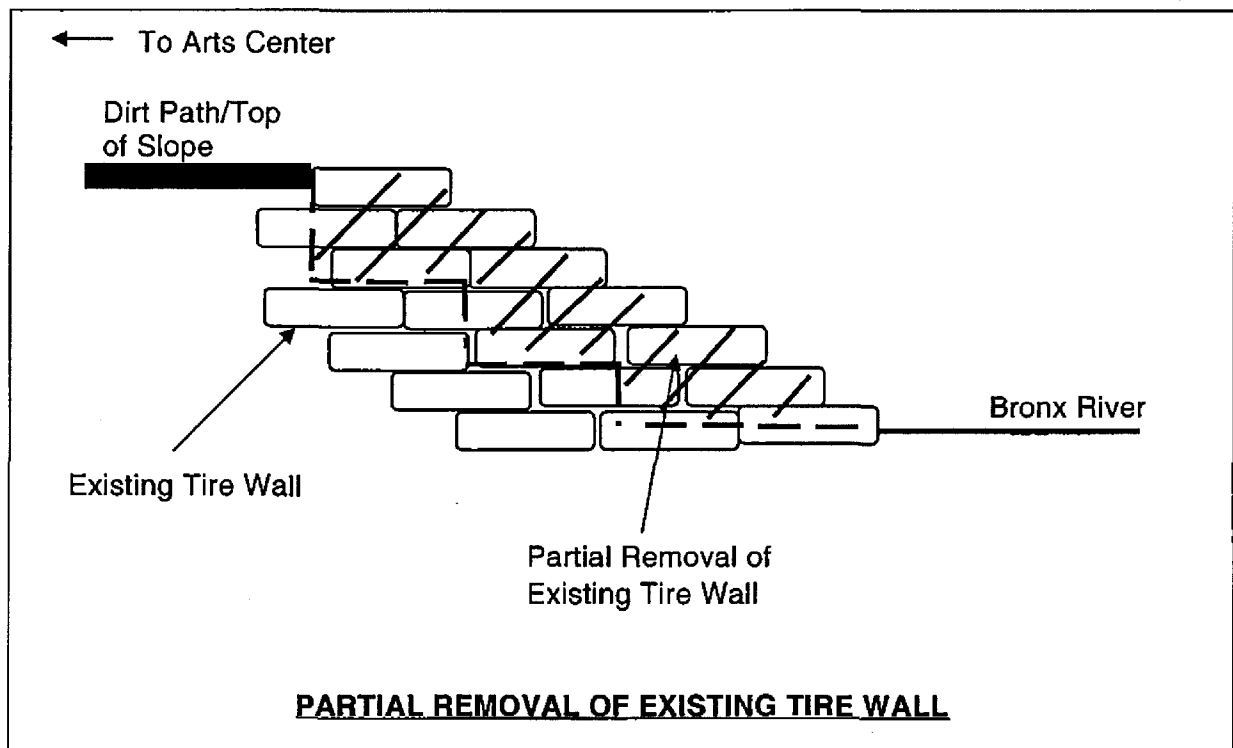
FIG:

5649301

NTS

12/01/06

5



Schematic diagram of partial removal of tire wall and construction of a rip-rap slope



21 Penn Plaza, Suite 900 New York, NY 10001
P: 212.479.5400 F: 212.479.5444
www.langan.com

NEW JERSEY PENNSYLVANIA NEW YORK CONNECTICUT FLORIDA

**The Reconstruction of Bronx River Park
RIP-RAP SLOPE**

BRONX

PROJ. NO:

5649301

SCALE

NTS

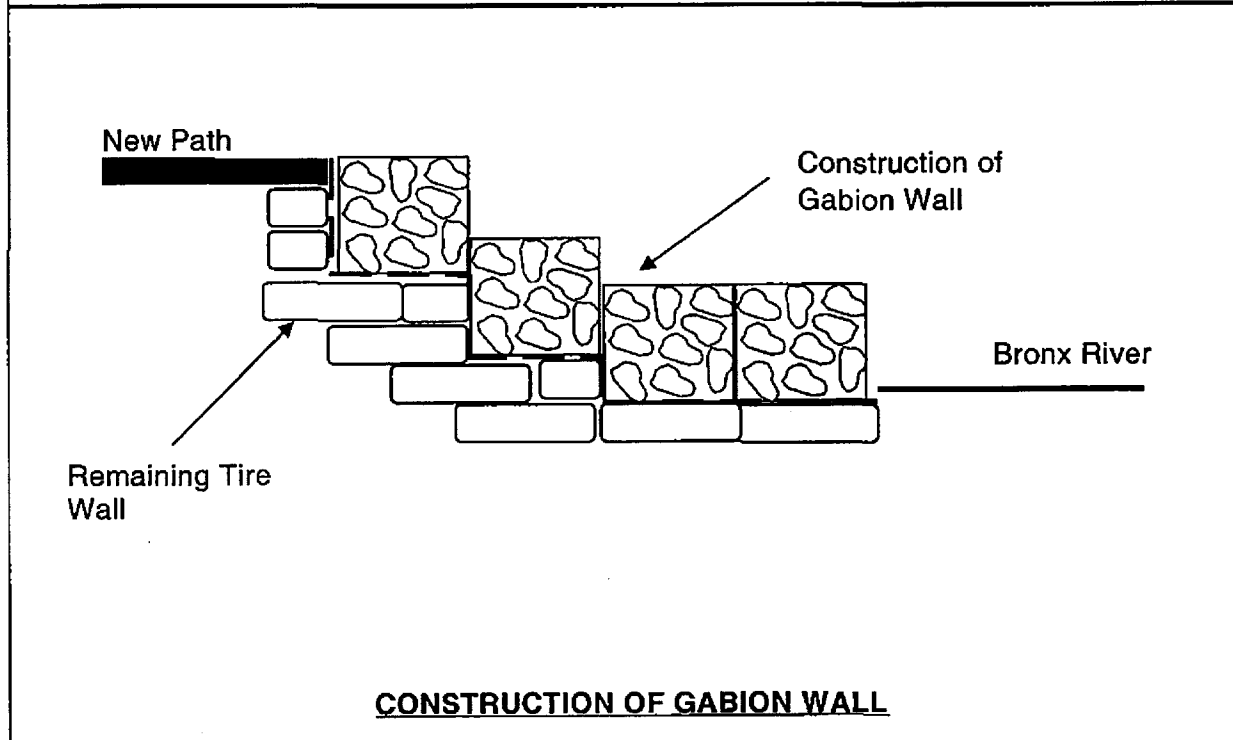
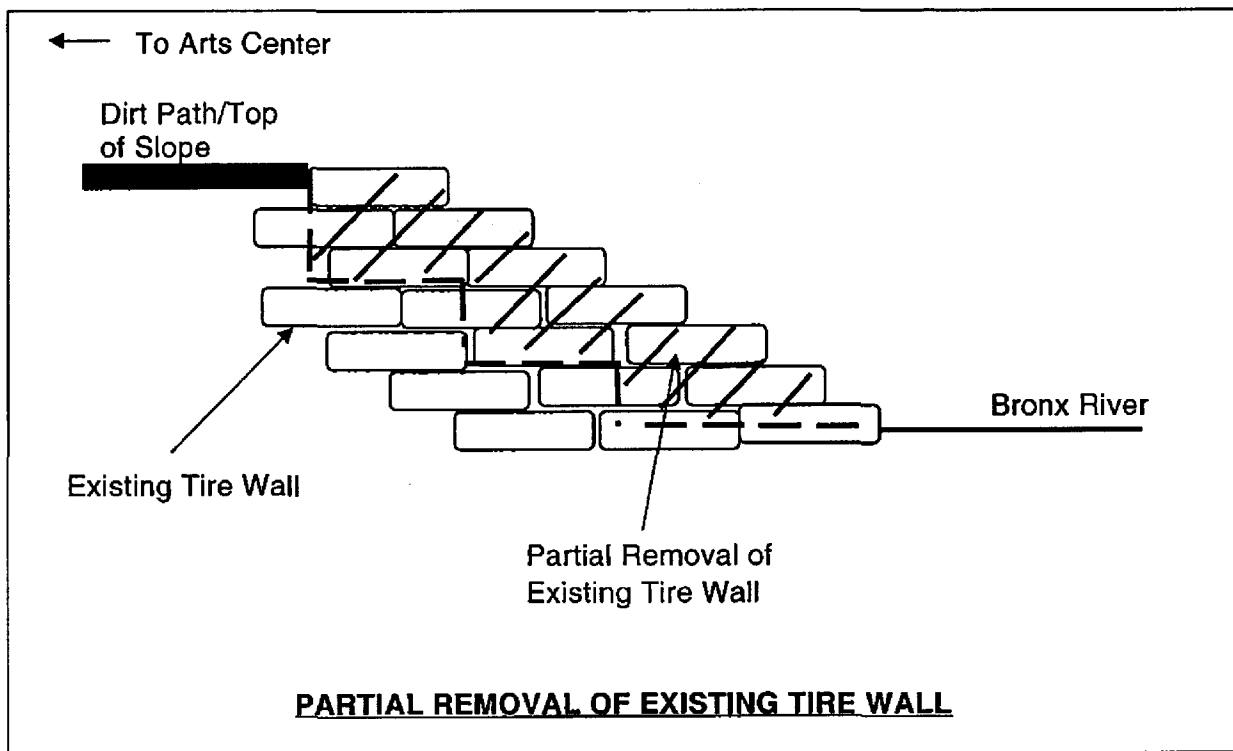
DATE

12/01/05

NEW YORK

FIG:

6



Schematic diagram of partial removal of tire wall and construction of a gabion wall.



21 Penn Plaza, Suite 900 New York, NY 10001
P: 212.479.5400 F: 212.479.5444
www.langan.com

NEW JERSEY PENNSYLVANIA NEW YORK CONNECTICUT FLORIDA

**The Reconstruction of Bronx River Park
GABION WALL**

BRONX

PROJ. NO:

5649301

SCALE

NTS

DATE

12/01/05

NEW YORK

FIG:

7

PROJECT BRONX RIVER PARK				PROJECT NO. 5649301			
LOCATION 960-1001 E. 179th ST. BRONX, NY				ELEVATION AND DATUM +15 BPSD			
DRILLING AGENCY JERSEY BORING				DATE STARTED 11/21/05		DATE FINISHED 11/21/05	
DRILLING EQUIPMENT KLEMM KR704				COMPLETION DEPTH 16 FT		ROCK DEPTH	
SIZE AND TYPE OF BIT 3" HOLLOW STEM AUGER				NO. SAMPLES		DIST. 8'	
CASING				WATER LEVEL		FIRST	
CASING HAMMER				WEIGHT		DROP	
SAMPLER 2" O.D. SPLIT SPOON				FOREMAN CANDIDO CRUZ			
SAMPLER HAMMER Safety				INSPECTOR AL BONURA			
WEIGHT 140 lb				DROP 30 IN			

MAT. SYMBOL	CLASS	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
				NO. LOG	TYPE	RECOVER. FT.	PENETR. RESIST. BLU/IN.	
FILL	11-65	No Recovery	1	S-1	SS	0 FT	3	
		Asphalt, Brick, so. c-f sand and gravel [FILL]	2	S-2	SS	2 FT	3	
		Asphalt, Brick, so. c-f sand and gravel [FILL]	3	S-3	SS	4 FT	4	
		Asphalt, Brick, so. c-f sand and gravel [FILL]	4	S-4	SS	6 FT	6	
		Asphalt, Brick, so. c-f sand and gravel [FILL]	5	S-5	SS	8 FT	10	
		Asphalt, Brick, so. c-f sand and gravel [FILL]	6	S-6	SS	10 FT	11	
		Br. dry c-f SAND, so. Asphalt, rock fragments, tr. Brick [FILL]	7	S-7	SS	12 FT	12	
		Br. dry c-f SAND, so. Asphalt, so. Brick, so. Rock fragments [FILL]	8	S-8	SS	14 FT	14	
		Br. dry c-f SAND, so. Brick, rock fragments [FILL]	9	S-9	SS	16 FT	16	
		Br. dry c-f SAND, so. Brick, rock fragments [FILL]	10	S-10	SS	18 FT	18	
		Br. dry c-f SAND, so. Brick, rock fragments [FILL]	11	S-11	SS	20 FT	20	
		Br. dry c-f SAND, so. Brick, rock fragments [FILL]	12	S-12	SS	22 FT	22	
		Br. dry c-f SAND, so. Brick, rock fragments [FILL]	13	S-13	SS	24 FT	24	
		Gray-Br. moist c-f Silty SAND and Gravel, rock fragments	14	S-14	SS	26 FT	26	

-Started breaking through asphalt with split spoon @ 3:20pm (auger head teeth are worn out)
 -Took S-1 0 FT - 2 FT
 -Took S-2 2 FT - 4 FT
 -Took S-3 4 FT - 6 FT
 -Took S-4 6 FT - 8 FT
 -Took S-5 8 FT - 10 FT
 -Took S-6 10 FT - 12 FT
 -Took S-7 12 FT - 14 FT

JOB NO. 5649301

LOG OF BORING NO. B-1

DATE _____

SHEET 2 OF 2

MAY. SYMBOL NOTES CLASS	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
			NO. LOC.	TYPE	RECOVER. FT.	PENETR. RESIST BL/6 IN.	
	Br. moist c-f silty SAND, so. Gravel, so. Rock fragments	14 15 16 17 18 19 20 21 22	5-8	SS	18 42 60 100/60		- Took S-8 14FT-16FT - Possible obstruction @ 16FT depth. Auger head teeth are worn out, can't advance End of boring @ 16FT @ 4:20pm

PROJECT BRONX RIVER PARK				PROJECT NO. 5649301			
LOCATION 960-1001 E. 179th St. BRONX, NY				ELEVATION AND DATUM +13 BPBD			
DRILLING AGENCY JERSEY BORING				DATE STARTED 11/21/05		DATE FINISHED 11/21/05	
DRILLING EQUIPMENT BLEMM KR704				COMPLETION DEPTH 14 FT		ROCK DEPTH	
SIZE AND TYPE OF BIT 3rd Hollow Stem Auger				NO. SAMPLES		DIST. 6	
CASING				WATER LEVEL		FIRST	
CASING HAMMER		WEIGHT		DROP		FOREMAN CANEDO CRUZ	
SAMPLER 2nd O.D. SPLIT SPOON				INSPECTOR AL BONURA			
SAMPLER HAMMER Safety		WEIGHT 140^{lb}		DROP 30ⁱⁿ			

MAT. SYMBOL	NO. OF CASES	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)	
				NO. LOC.	TYPE	RECOV. FT.	PENETR. RESIST. BU 6 IN.		
FILL	11-65	Br. dry m-f silty SAND, so. Brick - [FILL]	1	S-1	SS	6 ⁱⁿ	2		
		Br. dry m-f silty SAND, so. Brick, [FILL]	2			4	12		
			3	S-2	SS	3 ⁱⁿ	5		11
			4			4	6		8
			5	S-3	SS	4 ⁱⁿ	3		4
			6				3		4
FINE SAND	8-65	White dry c-m silty SAND, so. Brick, rock fragments [FILL]	7					- Began drilling @ 12:45pm	
			8	S-4	SS	1.5 ⁱⁿ	100/50	- Took S1 0ft-2ft	
			9					- Took S2 2ft-4ft	
			10					- Took S3 4ft-6ft	
			11	S-5	SS		24	- Drilled too far with auger	
			12					- Took S-4 7ft-9ft	
			13	S-6	SS		20	- Took S-5 from 10ft-12ft	
			14					- Took sample S-6 from 12ft-14ft	
						- Drilled from 8ft to 10ft with very slow advancement with auger bit			
						- Took sample S-5 from 10ft-12ft			
						- Took sample S-6 from 12ft-14ft			
						End of boring @ 14ft @ 2:20pm			

PROJECT BRONX RIVER PARK				PROJECT NO. 5649301			
LOCATION 960-1001 E. 179th ST. BRONX, NY				ELEVATION AND DATUM +18 BPBD			
DRILLING AGENCY JERSEY BORING				DATE STARTED 11/21/05		DATE FINISHED 11/21/05	
DRILLING EQUIPMENT KLEM KR704				COMPLETION DEPTH 8 FT		ROCK DEPTH	
SIZE AND TYPE OF BIT 3" Hollow Stem Auger				NO. SAMPLES		DIST. 4	
CASING				WATER LEVEL		FIRST	
CASING HAMMER				WEIGHT		DROP	
SAMPLER 2" O.D. SPLIT SPOON				FOREMAN CANDIDO CLUZ			
SAMPLER HAMMER Safety				INSPECTOR AL BONURA			
WEIGHT 140				DROP 30"			

MAT. SYMBOL	NYC BC CLASS	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES				REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
				NO. LOC.	TYPE	REC'D. FT.	PENETR. RESIST. BLU IN.	
FILL	11-65	Br. dry m-f silty SAND, tr. pebbles, tr. clay [FILL]	1	5-1	SS	8"	2	
		Gr. dry c-f SAND, so. pebbles, so. asphalt, rock fragments, so. gravel [FILL]	2	5-2	SS	4"	4	
		Br. dry m-f silty SAND, rock fragments, gravel [FILL]	3	5-3	SS	17"	17	
		Br. dry c-f silty SAND, so. gravel, rock fragments [FILL]	4	5-4	SS	24"	24	
			5			34"	34	
			6			50"	50	
			7			70"	70	
			8					
			9					
			10					
			11					
			12					
			13					
			14					



Test Pit 1: Stone foundation of Arts Center



21 Penn Plaza, Suite 900
P: 212.479.5400
www.langan.com

New York, NY 10001
F: 212.479.5444

NEW JERSEY PENNSYLVANIA NEW YORK CONNECTICUT FLORIDA

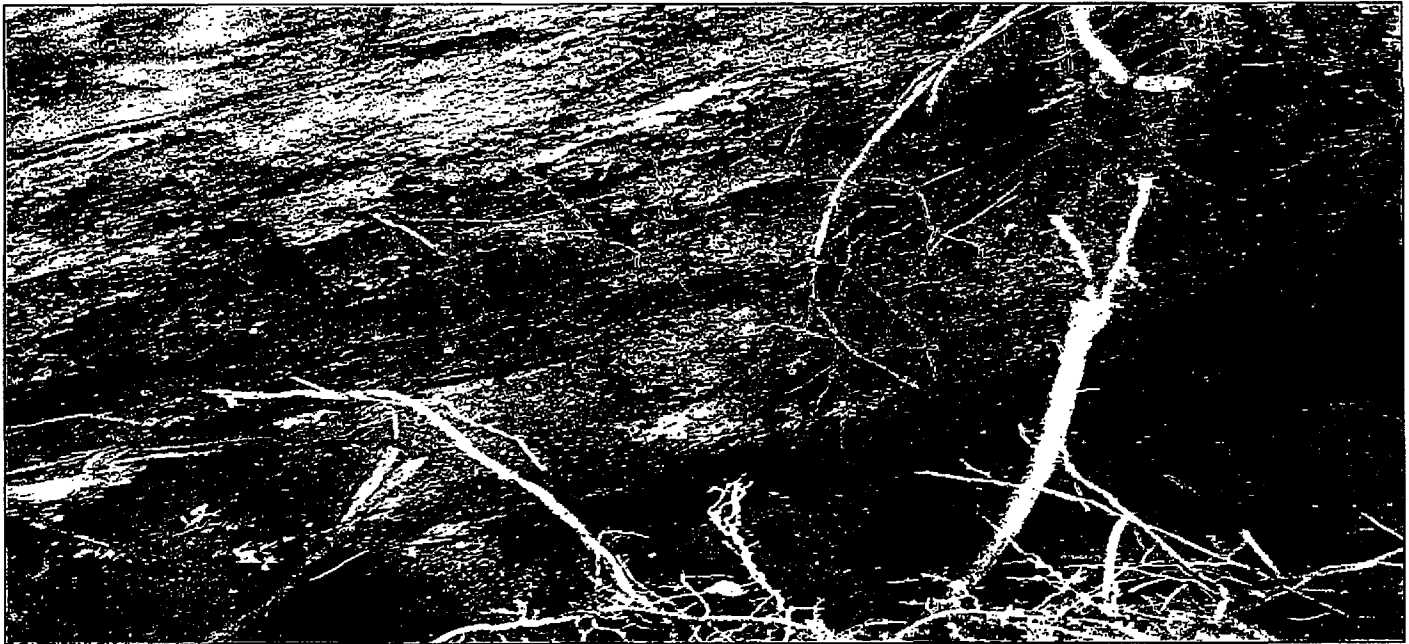
The Reconstruction of Bronx River Park

TEST PIT 1

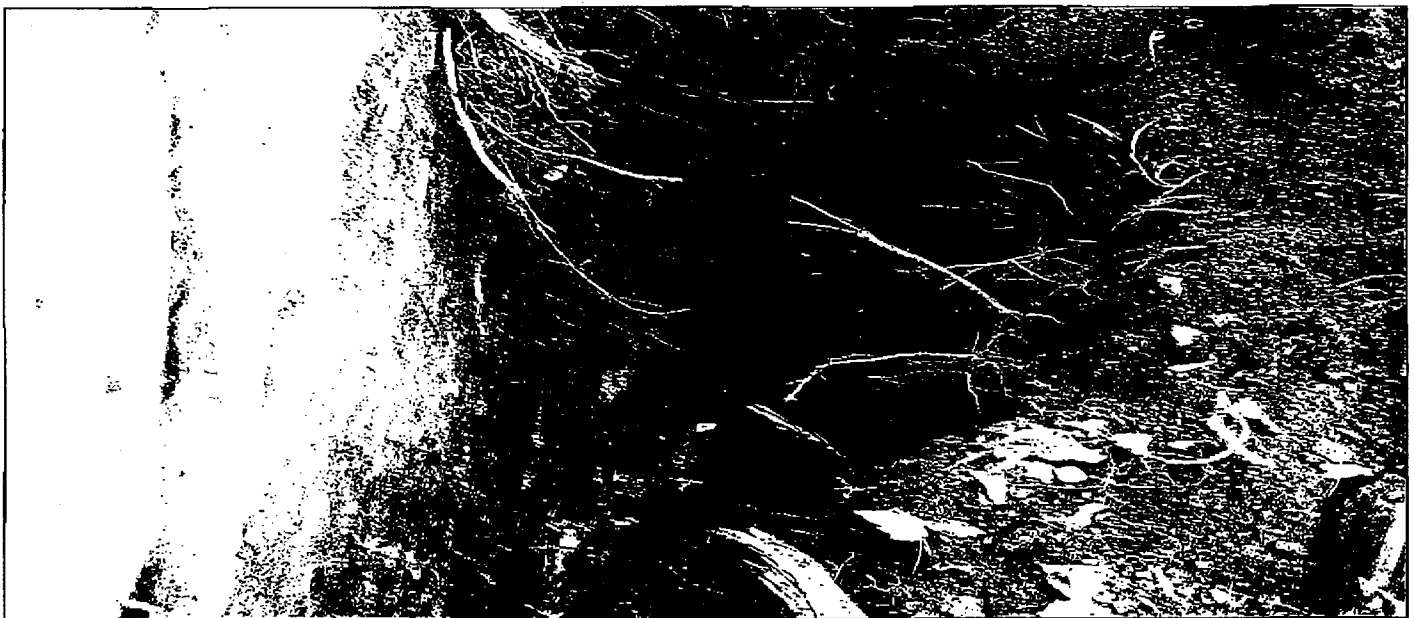
BRONX

NEW YORK

PROJ. NO:	SCALE	DATE	APP.
5649301	NTS	12/01/05	B



Test Pit 2 stone foundation of Arts Center



Test Pit 2 stone foundation of Arts Center



21 Penn Plaza, Suite 900 New York, NY 10001
P: 212.479.5400 F: 212.479.5444
www.langan.com

NEW JERSEY PENNSYLVANIA NEW YORK CONNECTICUT FLORIDA

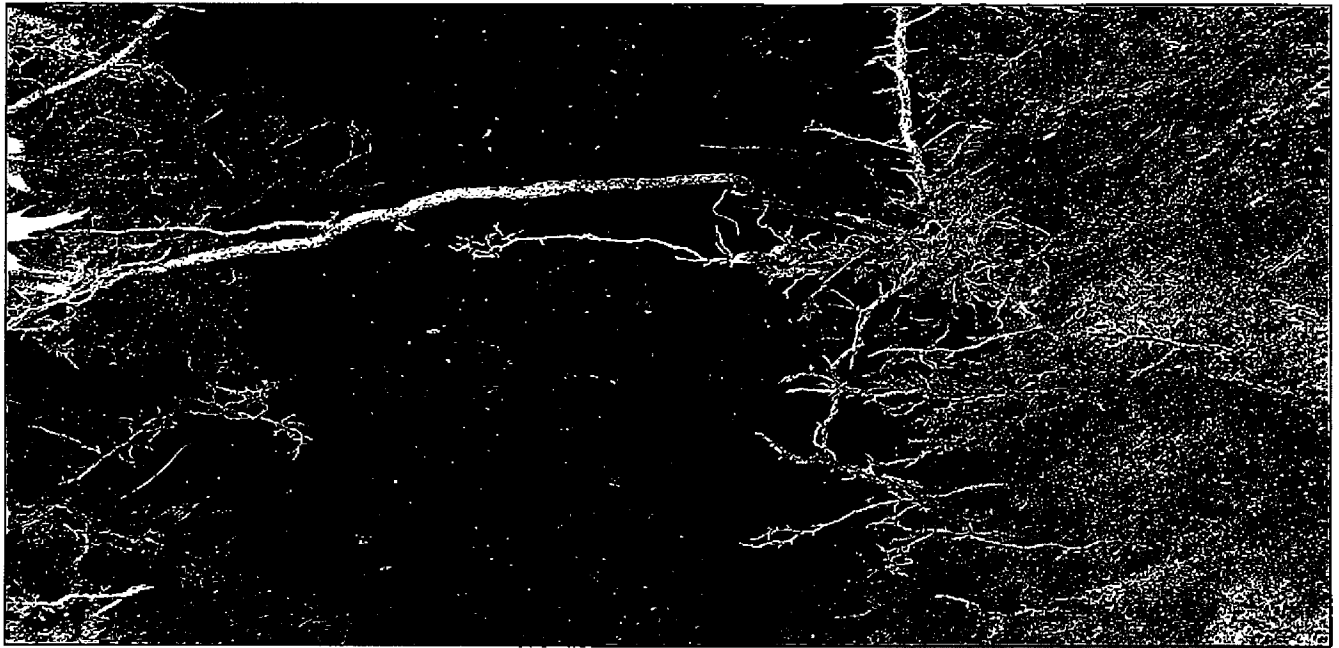
The Reconstruction of Bronx River Park

TEST PIT 2

BRONX

NEW YORK

PROJ. NO:	SCALE	DATE	APP.
5649301	NTS	12/01/05	B



Test Pit 3



Test Pit 3



21 Penn Plaza, Suite 900 New York, NY 10001
P: 212.479.5400 F: 212.479.5444
www.langan.com

NEW JERSEY PENNSYLVANIA NEW YORK CONNECTICUT FLORIDA

The Reconstruction of Bronx River Park

TEST PIT 3

BRONX

NEW YORK

PROJ. NO.	SCALE	DATE	APP.
5649301	NTS	12/01/05	B



Test Pit 4



Test Pit 4



21 Penn Plaza, Suite 900 New York, NY 10001
P: 212.479.5400 F: 212.479.5444
www.langan.com

NEW JERSEY PENNSYLVANIA NEW YORK CONNECTICUT FLORIDA

The Reconstruction of Bronx River Park

TEST PIT 4

BRONX

NEW YORK

PROJ. NO:	SCALE	DATE	APP.
5649301	NTS	12/01/05	B



Test Pit 5 – Supplementary excavation to determine nature of drilling obstruction.



21 Penn Plaza, Suite 900 New York, NY 10001
P: 212.479.5400 F: 212.479.5444
www.langan.com

NEW JERSEY PENNSYLVANIA NEW YORK CONNECTICUT FLORIDA

The Reconstruction of Bronx River Park

TEST PIT 5

BRONX

NEW YORK

PROJ. NO:

SCALE

DATE

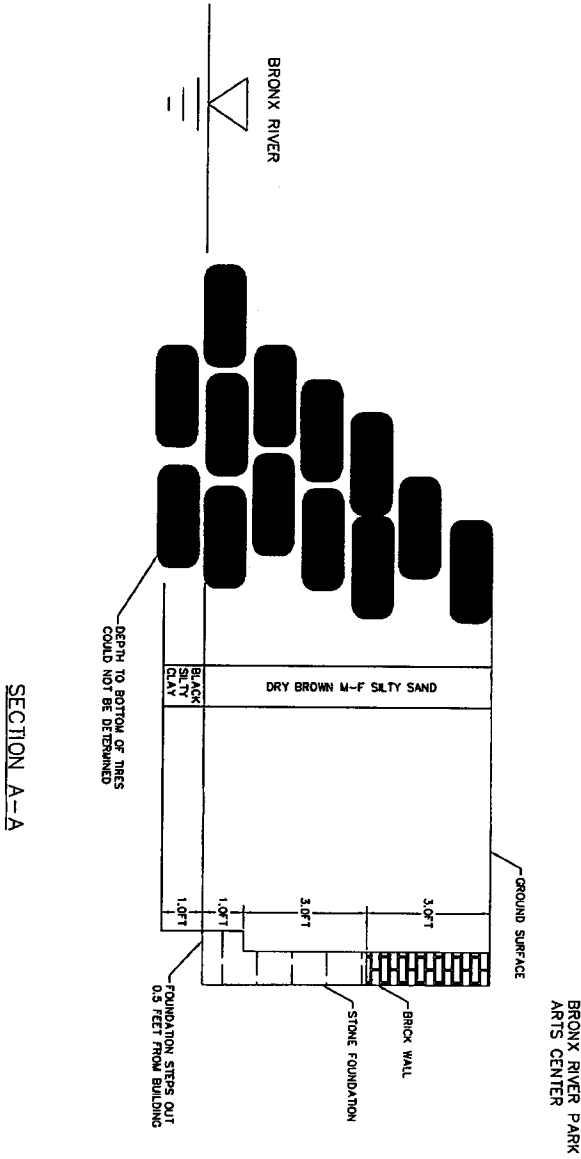
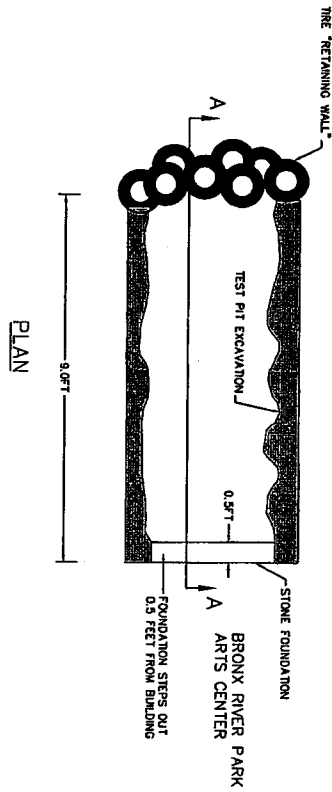
APP.

5649301

NTS

12/01/05

B



LANGAN
ENGINEERING & ENVIRONMENTAL SERVICES
30 South 17th Street, Suite 1500 Philadelphia, PA 19103
P: 215.864.0640 F: 215.864.0671
www.langan.com

NEW JERSEY PENNSYLVANIA NEW YORK CONNECTICUT FLORIDA

NJ Certificate of Authorization No. 241627396400

THE RECONSTRUCTION OF BRONX RIVER PARK
TYPICAL CONDITIONS ENCOUNTERED IN
TEST PITS TP-1 & TP-2

BRONX

Project No. 5649301 Date 12/15/05 Scale N.T.S. Des. No. NEW YOF App. I

Limited Phase II Environmental Site Investigation
For

Bronx River Arts Center
1087 East Tremont Avenue
Bronx, New York 10460

DDC ID NO. PV467-BRAC
WORK ORDER NO. 4996-LIRO-1R-4816
CONTRACT REGISTRATION NO. 20070020687

Prepared for:



Bureau of Environmental and Geotechnical Services
30-30 Thomson Avenue
Long Island City, New York 11101

Prepared by:



LiRo Engineers, Inc.
15-09 132nd Street, 2nd Floor
College Point, NY 11356

FINAL

SEPTEMBER 24, 2007

Table of Contents

EXECUTIVE SUMMARY	1
1.0 INTRODUCTION.....	1
1.1 PURPOSE.....	1
1.2 BACKGROUND	2
1.4 LIMITATIONS	3
1.5 PREVIOUS INVESTIGATIONS	3
1.6 SCOPE OF WORK.....	3
2.0 SITE CONDITIONS AND ENVIRONMENTAL SETTING	5
2.1 SITE LOCATION, DESCRIPTION AND USE	5
2.2 TOPOGRAPHY	5
2.3 GEOLOGY	5
2.4 HYDROGEOLOGY	6
3.0 FIELD INVESTIGATION.....	7
3.1 SOIL AND GROUNDWATER SAMPLING	7
4.0 INVESTIGATIVE RESULTS	9
4.1 SOIL DESCRIPTION.....	9
4.2 GROUNDWATER DESCRIPTION.....	9
4.3 LABORATORY RESULTS FOR SOIL AND GROUNDWATER SAMPLES	9
4.3.1 <i>Volatile Organic Compounds (VOCs) in Soil.....</i>	<i>10</i>
4.3.2 <i>Semi-volatile Organic Compounds (SVOCs) in Soil</i>	<i>10</i>
4.3.3 <i>Metals in Soil.....</i>	<i>10</i>
4.3.4 <i>VOCs in Groundwater.....</i>	<i>10</i>
4.3.5 <i>SVOCs in Groundwater.....</i>	<i>11</i>
4.3.6 <i>Metals in Groundwater.....</i>	<i>11</i>
5.0 CONCLUSIONS AND RECOMMENDATIONS.....	12
6.0 STATEMENT OF LIMITATIONS.....	16

Tables

- 1 Summary of Field Investigation
- 2 Summary of VOCs in Soil
- 3 Summary of SVOCs in Soil
- 4 Summary of Metals in Soil
- 5 Summary of VOCs in Groundwater
- 6 Summary of SVOCs in Groundwater
- 7 Summary of Metals in Groundwater

Figures

- 1 USGS Site Location Map
- 2 Boring Location Plan

Appendices

- A Geologic Boring Logs
- B Laboratory Report Forms

EXECUTIVE SUMMARY

On behalf of the New York City Department of Design and Construction (DDC), LiRo Engineers, Inc. (LiRo) conducted a Limited Phase II Environmental Site Investigation of the Bronx River Arts Center (the Site) located in South Central Bronx, New York. The Site is located at 1087 East Tremont Avenue and is bounded by Bronx Street to the west, East Tremont Avenue to the south, Bronx River to the east and an elevated Metropolitan Transit Authority (MTA) train track to the north. The Site location is shown in Figure 1.

The site is currently owned by the City of New York Department of Housing Preservation and Development (HPD) and leased by the Bronx River Arts Center (BRAC). The Site has an area of approximately 10,817 square feet. The site contains a 16,000 square foot four-story warehouse building and is a place where artists can create and exhibit their work.

LiRo Engineers, Inc. (LiRo) completed the field investigation August 17 & 20, 2007. This investigation was performed to evaluate environmental concerns identified during a geotechnical survey conducted by Matrix Engineering Services, P.C. (Matrix) in February 2007 and a preliminary site walk-through conducted by LiRo in August 2007. The Phase II investigation included the advancement of 11 soil borings for the collection of soil samples. One (1) soil boring was converted to a temporary well point for the collection of a groundwater sample. In addition to the temporary monitoring well point, a groundwater sample was also collected from an existing monitoring well located along the Bronx Street sidewalk. A sample location plan is presented in Figure 2.

The analytical results of the grab and column composite soil samples have been compared to the NYSDEC STARS Memo # 1 and the Recommended Soil Cleanup Objectives (RSCO) included in the NYSDEC TAGM 4046 dated 1994. Groundwater sample results were compared to NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1-Ambient Water Quality Standards and Guidance Values.

Findings

Based on the results of this field investigation and a review of the analytical results compared to the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) 4046 and NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1, the following findings are presented:

- The basement and garage of the building are kept in poor condition with widespread debris. A large pile of debris was present (see Figure 2 for approximate location) and the floor of the garage is in poor condition.
- Field screening for evidence of olfactory signs, staining and/or discoloration and PID readings, revealed suspect contamination at one location (PID reading of 51 ppm at SB-9) in the subsurface fill material. Field screening results are summarized in Table 1.
- Of the eleven soil samples collected during this ESI, only one exceedance of TAGM RSCOs was detected (530 ppb acetone at SS-3). Acetone is commonly used to clean laboratory glassware and the detection may be attributable to a laboratory source. Detected VOCs are summarized in Table 2.
- SVOCs were detected above TAGM RSCOs in eight of the 11 soil samples collected during this ESI. Specific compounds found to exceed their associated RSCOs include chrysene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene and dibenz(ah)anthracene. The compounds detected are typical components of historic fill. Detected SVOCs are summarized in Table 3.
- Metals were detected above TAGM RSCOs in each of the eleven soil samples collected during this ESI. Detected metals concentrations were observed to exceed their respective Eastern USA Background concentration in eight of the eleven samples. The specific metals detected above TAGM RSCOs include cadmium, chromium (below Eastern USA background levels), copper, iron (below Eastern USA background levels), lead, magnesium, nickel (below Eastern USA background levels), zinc and mercury. The metals detected are commonly found in New York City fill material. Table 4 presents a summary of the metals results in soil.
- VOCs were detected above NYSDEC TOGS in the groundwater sample collected from SB-9/TWP-3. No exceedances of TOGS standards were observed in the sample collected from previously existing monitoring well 2. The specific compounds detected above NYSDEC TOGS from the water sample collected from TWP-3 include isopropylbenzene, n-propylbenzene, tert-butylbenzene, sec-butylbenzene and 4-isopropyltoluene. These compounds are associated with petroleum products, however, there is no apparent petroleum source (i.e., tanks/piping) in the yard area portion of the site where the contamination was observed. The groundwater VOCs may result from leaching of historic

fill or from the former property use for vehicle repair. Table 5 presents a summary of the VOC analysis in groundwater.

- SVOCs were detected above NYSDEC TOGS in both of the groundwater samples collected. The specific compounds detected above NYSDEC TOGS include benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, indeno(1,2,3-cd)pyrene, and bis(2-ethylhexyl)phthalate. The SVOCs may result from leaching of historic fill or from the former motor vehicle repair property use. Table 6 presents a summary of the SVOC analysis in groundwater.
- Metals were detected above NYSDEC TOGS in both of the groundwater samples collected. The specific metals which were detected above NYSDEC TOGS include Arsenic, Barium, Beryllium, Cadmium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Silver, Sodium and Zinc. The elevated metals are attributable primarily to historic fill. Table 7 presents a summary of the metals analysis in groundwater.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of this field investigation and the analytical testing, LiRo has made the following conclusions and recommendations:

Based upon the Phase II investigation results, the soil and groundwater contamination present at the Site appears to have resulted primarily from historic filling activities. This conclusion is supported by the type of contaminants detected (i.e. primarily SVOCs and metals) widespread distribution of contamination and the absence of on-site reported spills or indicators of on-site sources (i.e. free product or distinct contaminant patterns). The historic site use as a motor vehicle repair may be a contributing factor for groundwater contamination that was observed.

Due to the source and level of the site contamination, the site does not appear to fall into any of NYSDEC's defined spill or environmental restoration program categories. As such, there is no requirement to remove contaminated soil from the site or to treat soil to any cleanup standard. Any contaminated soil which is excavated during the course of building construction is defined by NYSDEC as a solid waste and that material will be subject to applicable regulations for transport and disposal.

The New York City Department of Environmental Protection (NYCDEP) is typically responsible for overseeing construction at contaminated properties in New York City. To comply with NYCDEP remedial requirements, unpaved portions of the site require a secure barrier or cap preventing direct exposure to site soil contaminants for future site users. Future site construction workers will be potentially exposed to soil and groundwater contaminants during construction of the new building and during future construction activities requiring excavation. In order to protect site construction workers, the surrounding community, and the environment during the site construction phase, measures should be taken to ensure that any soils excavated for utilities or foundations are managed in accordance with applicable regulations. Based on the findings of this investigation, site construction plans should include the following provisions to address known site contaminants.

- A Construction Health and Safety Plan will be required to ensure that on-site construction workers and the surrounding community are not exposed to site contaminants. The Health and Safety plan should include a Community Air Monitoring Plan to mitigate potential exposure via fugitive dust.
- Should construction activities be planned for the site requiring excavation, a Remedial Action Plan (RAP) will be required to ensure that any contaminated soil excavated for building foundation structures or subsurface utilities is properly characterized, transported and disposed of at an off-site facility permitted to accept contaminated soil. The components of the RAP would include proper management (excavation, handling and disposal) of excavated material including soil to allow for the installation of utilities and the foundation components (pile caps, slab, etc.).
- Based upon the concentrations of VOCs and SVOCs detected in soil and groundwater, vapor intrusion does not appear to be a significant concern for the existing site building. However, slightly elevated levels of VOCs and SVOCs are present at the site, therefore, plans for any site redevelopment or improvement should include an evaluation of vapor intrusion. The current conditions in the site basement and garage (i.e., significant debris, heating oil storage, generally poor housekeeping) prevent any meaningful investigation of vapor intrusion. These conditions should be addressed prior to any evaluation of vapor intrusion or indoor air quality.
- If dewatering activities will be required for site redevelopment, groundwater should be characterized for compliance with NYCDEP discharge parameters. Based on the NYCDEP discharge analysis, a treatment approach should be developed if required. Groundwater treatment requirements for dewatering should also include provision for the disposal of contaminated sediment.

- Soil contamination is present in the undeveloped portion (i.e., vacant yard area) of the site. This area is fenced, so the contamination poses no current exposure risk. If the redevelopment plan calls for future use of the area, a minimum of 2 feet of “TAGM certified clean” fill cap (i.e. composition of fill below TAGM 4046 guidance values) should be placed over landscaped or any other non-paved areas.
- NYCDEP typically requires that clean fill must be certified by laboratory analysis for VOCs, SVOCs, Metals, PCBs and Pesticides at a sample frequency of 1 sample per 250 cubic yards of material. Results are submitted to NYCDEP for approval prior to import to the Site.
- If NYCDEP becomes involved in the site redevelopment, a Deed Restriction may be required for the property to ensure that future site intrusive construction or maintenance work will include the practices described above to prevent accidental exposure to contaminants.

1.0 INTRODUCTION

At the request of the City of New York Department of Design and Construction (DDC), LiRo Engineers, Inc. (LiRo) performed a Limited Phase II Environmental Site Investigation (ESI) for the Bronx River Arts Center (the Site) in South Central Bronx, New York. The Site is located at 1087 East Tremont Avenue and is bounded by Bronx Street to the west, East Tremont Avenue to the south, Bronx River to the east and an elevated Metropolitan Transit Authority (MTA) train track to the north. The site is currently owned by the City of New York Department of Housing Preservation and Development (HPD) and leased by the Bronx River Arts Center (BRAC). LiRo was advised that ownership of the property was transferring to BRAC. LiRo has prepared this Environmental Site Investigation (ESI) Report, which presents the results of the field investigation and laboratory analysis of collected soil and groundwater samples at the Site.

1.1 Purpose

The purpose of this Limited Phase II ESI Report is to identify contamination in site soils and/or groundwater based on limited information identified during a geotechnical survey conducted in February 2007 and a preliminary site walk-through conducted in August 2007. No Phase I Environmental Site Assessment was conducted or required for the property transfer, and as such, LiRo's Phase II investigation was limited to a general assessment of soil and groundwater conditions at the site. The Site location is included as Figure 1. A Sample Location Plan is presented as Figure 2. LiRo has prepared this Limited ESI Report for the sole use of the client unless written approval is granted by the client and LiRo.

Based on observations and site history, the following activities were performed as part of the ESI and are discussed in this report:

- Advancement of four (4) Geoprobe soil borings in the yard area, four (4) split spoon borings in the garage area and three (3) split spoon borings in the basement area;
- Field screening, consisting of visual and olfactory indicators and Photo-Ionization Detector (PID) readings to add in selection of soil samples for laboratory analysis based on contaminant indicators;
- The collection of one (1) groundwater samples from a temporary well point installed at soil boring SB-9. One additional groundwater sample was collected from existing monitoring well 2;

- Soil and groundwater sample laboratory analysis;
- Data review and evaluation; and
- Investigation Summary preparation.

In addition, the report presents background information including a summary of a geotechnical survey conducted in February 2007.

1.2 Background

The Site has an area of approximately 10,817 square feet. Currently, the site is owned by HPD and leased by BRAC. The site contains a 16,000 square foot four-story warehouse building and is a place where artists can create and exhibit their work. The building is scheduled for reconstruction. The site is located in a manufacturing area of the Borough of Bronx, New York. Land in the immediate vicinity of the site is developed with a bus depot, auto repair shop, commercial and industrial properties. Industrial, commercial and residential properties surround the site. The Bronx River runs immediately adjacent to the East side of the site. The site is situated at an elevation of approximately 10 feet above mean sea level.

A preliminary site walk-through of the Site was performed on August 2, 2007 by Bob Kreuzer, Project Manager, of LiRo; Nicole Motto, Environmental Scientist, of LiRo; and Diane Bocanegra of BRAC. The exterior of the building and the interior of the garage area and basement were inspected during the walk-through. The findings of the inspection are as follows:

- The north side of the Site is a vacant yard and LiRo was advised that the area was formerly a motor vehicle service garage in 1946.
- A 3'x 6' entrance door located at the northwest corner of the building leads to the garage. The garage contains two rooms. The first room had debris scattered across the concrete floor and a concrete pad was located towards the entrance of the second room. The second room contained a 4" raised wood floor in poor condition.
- A fill port, vent and storm door hatch are located on the west side of the exterior building. The fill and vent lines were active and traced to a concrete encased heating oil Aboveground Storage Tank (AST) located in the northern portion of the basement. The storm door hatch provided access into the basement. The northern portion of the basement also contains a boiler and sump. The southern portion of the basement contains a concrete pad, which could have been used for a tank or boiler system.
- The Bronx River runs immediately adjacent to the east side of the site. The riverbank is currently

stabilized through a retention wall constructed of used rubber automobile tires and typical construction fill material (i.e. sand, gravel and concrete/brick fragments).

1.4 Limitations

This Phase II Investigation was conducted solely to evaluate potential soil and groundwater contamination relating to previous observation of petroleum odor in soil (see Section 1.5) and information provided to LiRo identifying a site historical use for motor vehicle repair. LiRo did not conduct a Phase I Environmental Site Assessment to fully evaluate recognized environmental conditions associated with the property, nor was LiRo made aware that any such investigation had ever been performed at the site.

1.5 Previous Investigations

In February 2007, Matrix Engineering Services, P.C. (Matrix) performed a geotechnical survey of the Site on behalf of the City of New York Department of Design and Construction (DDC). LiRo Engineers (LiRo) reviewed a record of borings prepared by Matrix on February 8, 2007. As shown in Figure 2, three borings were installed in the vacant yard at the north end of the Site, one monitoring well at the sidewalk on Bronx Street and one boring at the sidewalk on East Tremont Avenue. Fill with a mixture of sand, silt and gravel was observed to depths ranging from 13 feet below ground surface (ftbgs) to 18 ftbgs. Between the fill and bedrock lies sand with varying mixtures of silt, gravel and cobbles. The depth to bedrock ranged from 26 ftbgs to 45 ftbgs. Groundwater was encountered at approximately 10-11 ftbgs. A petroleum odor was discovered at previous soil boring 3 at 13 ftbgs.

1.6 Scope of Work

Based on observations and history, the site may have been impacted by petroleum related contamination from the former motor vehicle service garage and the active heating oil AST. The purpose of this Limited Phase II Investigation is to evaluate possible contamination in the soil and groundwater at the site.

The general scope of work includes the following:

- Advancement of four (4) Geoprobe soil borings in the exterior “yard” portion of the site and of seven (7) pneumatic hammer-driven split-spoon borings in building interior areas;
- Field screening, consisting of visual and olfactory indicators and Photo-Ionization Detector (PID) readings to aid in selection of soil samples for laboratory analysis based on contaminant indicators;

- The collection of eleven (11) soil samples for environmental analysis;
- The collection of two (2) groundwater samples. One of the samples was collected from a temporary well point installed at soil boring SB9; and one sample was collected from a previously installed monitoring well;
- Soil and groundwater sample laboratory analysis;
- Data review and evaluation; and
- Investigation Summary preparation.

LiRo performed a subsurface soil investigation which consisted of advancing four (4) Geoprobe borings in exterior portions of the site and seven (7) split-spoon borings in interior portions of the site. The work was conducted on August 17th and 20th, 2007. Sampling locations are shown on Figure 2. Proposed split spoon boring SS-8 was not advanced due to debris piles limiting access in that portion of the site.

The Geoprobe borings were advanced to refusal which was encountered at 19 ftbgs at each of the four (4) locations. Due to limited access in building interior areas, a pneumatic hammer was used to advance split-spoon borings to a depth of 6 feet at interior locations. Environmental soil samples were collected at each boring location. One (1) boring was completed with a temporary well point for collection of a groundwater sample and an additional groundwater sample was collected from a previously installed (for the geotechnical investigation referenced above) monitoring well located along the Bronx Street sidewalk. LiRo also conducted organic vapor screening using a photoionization detector (PID) during the advancement of soil borings to evaluate soil vapor conditions.

2.0 SITE CONDITIONS AND ENVIRONMENTAL SETTING

2.1 Site Location, Description and Use

The Site is located at 1087 East Tremont Avenue and is bounded by Bronx Street to the west, East Tremont Avenue to the south, Bronx River to the east and an elevated Metropolitan Transit Authority (MTA) train track to the north. The Site location is shown in Figure 1. The site is currently owned by the City of New York Department of Housing Preservation and Development (HPD) and leased by the Bronx River Arts Center (BRAC). The Site has an area of approximately 10,817 square feet. The site contains a 16,000 square foot four-story warehouse building and is a place where artists can create and exhibit their work. A concrete encased heating oil AST is located in the basement. The building is scheduled for reconstruction. The north side of the Site is a vacant yard and LiRo was advised that the area was formerly a motor vehicle service garage in 1946.

The site is located in a manufacturing area of the Borough of Bronx, New York. Land in the immediate vicinity of the site is developed with a bus depot, auto repair shop, commercial and industrial properties. Industrial, commercial and residential properties surround the site. The Bronx River runs immediately adjacent to the East side of the site. The riverbank is currently stabilized through a retention wall constructed of used rubber automobile tires and typical construction fill material (i.e. sand, gravel and concrete/brick fragments).

2.2 Topography

LiRo reviewed the United States Geologic Survey (U.S.G.S), Bronx, NY 7.5-minute Topographic Quadrangle Map. The site is relatively flat and situated at an elevation of approximately 10 feet above mean sea level.

2.3 Geology

Similar to Manhattan, Bronx County is underlain by high grade metamorphic bedrock consisting of a sequence of Cambrian and Ordovician gneiss, schistose-gneiss, and marble. Bedrock is extensively exposed on the west side and northern quarter of Bronx County and less exposed southeast towards Hunts Point and Throgs Neck.

The geologic contacts display a series of northwest trending folds. The northwest trending folds have resulted in a series of northwest trending valleys and ridges. The bedrock is also characterized by

numerous steeply dipping northwest-southeast trending normal and reverse faults many of which are transmissive and contain groundwater.

Pleistocene glacial and glaciofluvial sediments as well as recent river, alluvium, and salt marsh deposits overly the bedrock. Glacial till in the south Bronx varies in thickness from less than 5 feet to over 100 feet and averages about 25 feet. interbedded lake bed sediments are usually encountered in the south Bronx along the Harlem River valley and the Bronx shore inland to Sedgwick Avenue at approximately 20 feet below ground surface. Thickness of these sediments ranges from 7 to 20 feet. They are generally underlain by stratified sand, clay and gravel with a thickness of 7-20 feet. The glacial tills underlying these lakebed sediments generally overlie eroded and decomposed bedrock.

In places, deep valleys were gouged out of the rock by glacial activity. These valleys were subsequently filled with organic material and other glacial sediments. In many places in the Bronx as much as 30 feet of artificial fill material (construction and demolition debris mixed with sand, gravel, rock and cinders) overlies Holocene salt marsh and alluvial deposits, Pleistocene glacial drift, or bedrock.

Groundwater is present within the unconsolidated sediments and generally occurs from 10 to 20 feet below ground surface. Groundwater also occurs in bedrock within secondary permeability zones such as fractures, faults and foliation planes. In the region of the Inwood Marble, north of Manhattan, a karst aquifer exists, with groundwater occurring in dissolution fractures and voids within the marble. In general, regional groundwater flow direction is controlled by regional topography with groundwater flow from higher to lower elevations. Along the Harlem River, Hudson River, and Long Island Sound, groundwater elevations and flow can be tidally influenced, resulting in groundwater elevation fluctuations and deflections in flow direction.

The previous geotechnical survey encountered bedrock from 26 ftbgs to 45 ftbgs.

2.4 Hydrogeology

Groundwater was observed in the Geoprobe boreholes at depths ranging from approximately 11 to 14.5 feet below ground surface (bgs) at the site. Groundwater flow direction at the site is likely toward the Bronx River which lies immediately East of the site.

3.0 FIELD INVESTIGATION

LiRo performed the environmental field screening and sample collection during the soil boring activities completed on the Site. LiRo personnel were present for field screening and sampling activities at four (4) Geoprobe borings and seven (7) split-spoon borings which were advanced at the Site. Environmental soil samples were collected at each boring location. One (1) of the boring locations was completed with a temporary well point for collection of a groundwater sample and an additional groundwater sample was collected from a previously installed monitoring well located along the Bronx Street sidewalk. LiRo also conducted organic vapor screening using a PID.

The sample containers were preserved at 4 degrees Celsius in a cooler with ice prior to and during shipment. Chain-of-Custody documentation accompanied the samples during shipment. The samples were sent to EMSL, NYS Department of Health (DOH) certified laboratory [ELAP No. 102581] for analysis. Soil samples were analyzed for Target Compound List (TCL) volatile organic compounds (VOCs) using USEPA Method 8260, semivolatile organic compounds (SVOCs) using USEPA Method 8270, and TAL Metals by USEPA Method Series 5000/6000. Groundwater samples were analyzed for Target Compound List (TCL) VOCs using USEPA Method 8260, SVOCs using USEPA Method 625, and TAL Metals by USEPA Methods 200.7 and 245.1. The laboratory reports are included as Appendix B.

This following section presents a summary of the field program. The results of the sample analysis are presented in Section 3. At the request of the DDC, field derived Quality Assurance/Quality Control samples (i.e. field blank, trip blank, split-sample) were neither collected nor analyzed for this project.

3.1 Soil and Groundwater Sampling

Prior to drilling, ADT contacted dig safe mark out and obtained the necessary permits. The Geoprobe borings were advanced until sampler refusal was encountered and the split spoon borings were advanced to a depth of 6 feet bgs.

All collected soil samples were examined for visual evidence (staining, discoloration) and olfactory indications (odors) of contamination. A Photo-Ionization Detector (PID) equipped with a 10.6 eV lamp was used to qualitatively screen the soil for VOCs and certain semivolatile organic compounds (SVOCs) that have ionization potentials within the range of the 10.6 eV lamp. The PID screening procedure

consisted of collecting soil in a plastic zip-locked bag, allowing the soil to reach ambient outdoor temperature, and then inserting the PID probe into open space within the bag to observe a head space reading. The readings from the field screening measurements as well as descriptions of staining and/or odors detected can be found in Table 1 and on the Geologic Boring Logs in Appendix A.

Soils to be analyzed were collected from areas of visible contamination, PID readings or from the depth chosen by the on-site geologist. For VOC analysis, a grab sample was collected at the water table when no signs of contamination were present. For the other analysis (SVOCs and Metals) composite samples were collected from throughout the boring soil column. Soil classification information and PID readings were documented on the boring logs included in Appendix A. The soil samples selected for laboratory analysis were transferred from the zip-lock bags into laboratory prepared sample jars and properly labeled. All soil boring equipment was rinsed in tap water, then scrubbed with an Alconox / tap water mixture and finally rinsed with tap water again between each sample interval. The borings were back-filled with drill cuttings and sealed with cement grout upon completion.

The analytical data for boring grab samples were compared to the Recommended Soil Cleanup Objectives (RSCOs) given in the NYSDEC TAGM Memo #4046.

A temporary well point was installed at boring location SB9/TWP3. Groundwater was collected with a peristaltic pump and placed into laboratory supplied sample jars and properly labeled. An additional sample was collected from an existing monitoring well identified as monitoring well 2. The samples were stored with ice in a cooler at 4° Celsius prior to and during shipment. A chain-of-custody was prepared, prior to sample shipment.

Groundwater samples were analyzed for Target Compound List (TCL) VOCs using USEPA Method 8260, SVOCs using USEPA Method 625, and TAL Metals by USEPA Methods 200.7 and 245.1.

4.0 INVESTIGATIVE RESULTS

A discussion of the analytical results of the soil and groundwater samples is included in the following sections.

4.1 Soil Description

Soil samples were screened and described in the field by a LiRo geologist. Soils at the site consisted primarily of regarded reddish brown to black sands with varying amount of silt and gravel. Field screening for evidence of olfactory signs, staining and/or discoloration and PID readings, revealed suspect contamination at one location (PID reading of 51 ppm at SB-9) in the subsurface fill material.

A summary of the field investigation is provided in Table 1 at the end of this report. Included in this summary are screening results (PID readings), boring completion depths, and locations of the samples submitted for laboratory analysis. Boring logs are attached in Appendix A and the locations of the borings are included in Figure 2.

4.2 Groundwater Description

Groundwater was observed in the Geoprobe boreholes at depths ranging from approximately 11 to 14.5 feet below ground surface (bgs) at the site. Groundwater flow direction at the site is likely toward the Bronx River which lies immediately East of the site.

4.3 Laboratory Results for Soil and Groundwater Samples

Grab soil samples were collected from all boring locations for Target Compound List (TCL) VOC analysis by EPA Method 8260. Soils were also composited from the entire length of the soil column from all borings and analyzed for SVOCs by EPA Method 8270 and Target Analyte List (TAL) Metals by EPA series 6000/7000.

The analytical results of the grab and column composite soil samples have been compared to the Recommended Soil Cleanup Objectives (RSCOs) included in the NYSDEC TAGM 4046 dated 1994. Tables 2 through 4 summarize the results of the soil sample analysis. Figure 2 depicts the soil boring locations.

Groundwater samples were collected from each of the six temporary well locations (LB-4 through LB-9) and analyzed for TCL VOCs using USEPA Method 8260, SVOCs using USEPA Method 625, and TAL

Metals by USEPA Methods 200.7 and 245.1. Groundwater analysis results were compared to the New York State Department of Environmental Conservation (NYSDEC) Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1 Guidance Values. Tables 5 through 7 summarize the results of the groundwater sample analysis. Figure 2 depicts the sampling locations.

4.3.1 Volatile Organic Compounds (VOCs) in Soil

Of the eleven soil samples collected during this ESI, only one exceedance of TAGM RSCOs was detected (530 ppb acetone at SS-3). Acetone is a common laboratory contaminant used to clean glassware. Detected VOCs are summarized in Table 2.

4.3.2 Semi-volatile Organic Compounds (SVOCs) in Soil

SVOCs were detected above TAGM RSCOs in eight of the 11 soil samples collected during this ESI. Specific compounds found to exceed their associated RSCOs include Chrysene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(a)pyrene and Dibenzo(ah)anthracene. Detected SVOCs are summarized in Table 3.

4.3.3 Metals in Soil

Metals were detected above TAGM RSCOs in each of the eleven soil samples collected during this ESI. Detected metals concentrations were observed to exceed their respective Eastern USA Background concentration in eight of the eleven samples. The specific metals detected above TAGM RSCOs include cadmium, chromium (below Eastern USA background levels), copper, iron (below Eastern USA background levels), lead, magnesium, nickel (below Eastern USA background levels), zinc and mercury. The metals detected are commonly found in New York City fill material. Table 4 presents a summary of the metals results in soil.

4.3.4 VOCs in Groundwater

VOCs were detected above NYSDEC TOGS in the groundwater sample collected from SB-9/TWP-3. No exceedances of TOGS standards were observed in the sample collected from previously existing monitoring well 2. The specific compounds detected above NYSDEC TOGS at TWP-3 include isopropylbenzene, n-propylbenzene, tert-butylbenzene, sec-butylbenzene and 4-isopropyltoluene. Table 5 presents a summary of the VOC analysis in groundwater.

4.3.5 SVOCs in Groundwater

SVOCs were detected above NYSDEC TOGS in both of the groundwater samples collected. The specific compounds detected above NYSDEC TOGS include benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, indeno(1,2,3-cd)pyrene, and bis(2-ethylhexyl)phthalate. Table 6 presents a summary of the SVOC analysis in groundwater.

4.3.6 Metals in Groundwater

Metals were detected above NYSDEC TOGS in both of the groundwater samples collected. The specific metals which were detected above NYSDEC TOGS include Arsenic, Barium, Beryllium, Cadmium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Silver, Sodium and Zinc. Table 7 presents a summary of the metals analysis in groundwater.

5.0 CONCLUSIONS AND RECOMMENDATIONS

A Limited Phase II Environmental Site Investigation was performed at the Bronx River Arts Center (the Site) in South Central Bronx, New York. LiRo Engineers, Inc. (LiRo) completed the Site work during August 2007. This limited investigation was performed to evaluate environmental concerns identified during a geotechnical survey conducted in February 2007 and a preliminary site walk-through conducted in August 2007. The investigation included field screening and laboratory analysis of soil and groundwater samples. Four (4) Geoprobe borings and seven (7) split-spoon borings were advanced at the site. Each of the Geoprobe borings were installed to refusal at 19 feet bgs. Each of the split spoon borings was advanced to completion at 6 feet bgs. One (1) of the boring locations was completed with a temporary well point for collection of a groundwater sample and an additional groundwater sample was collected from a previously installed monitoring well located along the Bronx Street sidewalk. The results from the Phase II Environmental Site Investigation were used to develop conclusions regarding contamination in site soils and groundwater and recommendations for the handling of site soils and groundwater during construction activities.

Based on the results of this field investigation and a review of the analytical results compared to the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) 4046 and NYSDEC Technical and Operational Guidance Series (TOGS) 1.1.1, the following findings are presented below:

- The basement and garage of the building are kept in poor condition with widespread debris. A large pile of debris was present (see Figure 2 for approximate location) and the floor of the garage is in poor condition.
- Field screening for evidence of olfactory signs, staining and/or discoloration and PID readings, revealed suspect contamination at one location (PID reading of 51 ppm at SB-9) in the subsurface fill material. Field screening results are summarized in Table 1.
- Of the eleven soil samples collected during this ESI, only one exceedance of TAGM RSCOs was detected (530 ppb acetone at SS-3). Acetone is commonly used to clean laboratory glassware and the detection may be attributable to a laboratory source. Detected VOCs are summarized in Table 2.

- SVOCs were detected above TAGM RSCOs in eight of the 11 soil samples collected during this ESI. Specific compounds found to exceed their associated RSCOs include chrysene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene and dibenz(ah)anthracene. The compounds detected are typical components of historic fill. Detected SVOCs are summarized in Table 3.
- Metals were detected above TAGM RSCOs in each of the eleven soil samples collected during this ESI. Detected metals concentrations were observed to exceed their respective Eastern USA Background concentration in eight of the eleven samples. The specific metals detected above TAGM RSCOs include cadmium, chromium (below Eastern USA background levels), copper, iron (below Eastern USA background levels), lead, magnesium, nickel (below Eastern USA background levels), zinc and mercury. The metals detected are commonly found in New York City fill material. Table 4 presents a summary of the metals results in soil.
- VOCs were detected above NYSDEC TOGS in the groundwater sample collected from SB-9/TWP-3. No exceedances of TOGS standards were observed in the sample collected from previously existing monitoring well 2. The specific compounds detected above NYSDEC TOGS from the water sample collected from TWP-3 include isopropylbenzene, n-propylbenzene, tert-butylbenzene, sec-butylbenzene and 4-isopropyltoluene. These compounds are associated with petroleum products, however, there is no apparent petroleum source (i.e., tanks/piping) in the yard area portion of the site where the contamination was observed. The groundwater VOCs may result from leaching of historic fill or from the former property use for vehicle repair. Table 5 presents a summary of the VOC analysis in groundwater.
- SVOCs were detected above NYSDEC TOGS in both of the groundwater samples collected. The specific compounds detected above NYSDEC TOGS include benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, indeno(1,2,3-cd)pyrene, and bis(2-ethylhexyl)phthalate. The SVOCs may result from leaching of historic fill or from the former motor vehicle repair property use. Table 6 presents a summary of the SVOC analysis in groundwater.
- Metals were detected above NYSDEC TOGS in both of the groundwater samples collected. The specific metals which were detected above NYSDEC TOGS include Arsenic, Barium, Beryllium, Cadmium, Chromium, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Silver, Sodium

and Zinc. The elevated metals are attributable primarily to historic fill. Table 7 presents a summary of the metals analysis in groundwater.

Based on the results of this field investigation and the analytical testing, LiRo has made the following conclusions and recommendations:

Based upon the Phase II investigation results, the soil and groundwater contamination present at the Site appears to have resulted primarily from historic filling activities. This conclusion is supported by the type of contaminants detected (i.e. primarily SVOCs and metals) widespread distribution of contamination and the absence of on-site reported spills or indicators of on-site sources (i.e. free product or distinct contaminant patterns). The historic site use as a motor vehicle repair may be a contributing factor for groundwater contamination that was observed.

Due to the source and level of the site contamination, the site does not appear to fall into any of NYSDEC's defined spill or environmental restoration program categories. As such, there is no requirement to remove contaminated soil from the site or to treat soil to any cleanup standard. Any contaminated soil which is excavated during the course of building construction is defined by NYSDEC as a solid waste and that material will be subject to applicable regulations for transport and disposal.

The New York City Department of Environmental Protection (NYCDEP) is typically responsible for overseeing construction at contaminated properties in New York City. To comply with NYCDEP remedial requirements, unpaved portions of the site require a secure barrier or cap preventing direct exposure to site soil contaminants for future site users. Future site construction workers will be potentially exposed to soil and groundwater contaminants during construction of the new building and during future construction activities requiring excavation. In order to protect site construction workers, the surrounding community, and the environment during the site construction phase, measures should be taken to ensure that any soils excavated for utilities or foundations are managed in accordance with applicable regulations. Based on the findings of this investigation, site construction plans should include the following provisions to address known site contaminants.

- A Construction Health and Safety Plan will be required to ensure that on-site construction workers and the surrounding community are not exposed to site contaminants. The Health and

Safety plan should include a Community Air Monitoring Plan to mitigate potential exposure via fugitive dust.

- Should construction activities be planned for the site requiring excavation, a Remedial Action Plan (RAP) will be required to ensure that any contaminated soil excavated for building foundation structures or subsurface utilities is properly characterized, transported and disposed of at an off-site facility permitted to accept contaminated soil. The components of the RAP would include proper management (excavation, handling and disposal) of excavated material including soil to allow for the installation of utilities and the foundation components (pile caps, slab, etc.).
- Based upon the concentrations of VOCs and SVOCs detected in soil and groundwater, vapor intrusion does not appear to be a significant concern for the existing site building. However, slightly elevated levels of VOCs and SVOCs are present at the site, therefore, plans for any site redevelopment or improvement should include an evaluation of vapor intrusion. The current conditions in the site basement and garage (i.e., significant debris, heating oil storage, generally poor housekeeping) prevent any meaningful investigation of vapor intrusion. These conditions should be addressed prior to any evaluation of vapor intrusion or indoor air quality.
- If dewatering activities will be required for site redevelopment, groundwater should be characterized for compliance with NYCDEP discharge parameters. Based on the NYCDEP discharge analysis, a treatment approach should be developed if required. Groundwater treatment requirements for dewatering should also include provision for the disposal of contaminated sediment.
- Soil contamination is present in the undeveloped portion (i.e., vacant yard area) of the site. This area is fenced, so the contamination poses no current exposure risk. If the redevelopment plan calls for future use of the area, a minimum of 2 feet of “TAGM certified clean” fill cap (i.e. composition of fill below TAGM 4046 guidance values) should be placed over landscaped or any other non-paved areas.
- NYCDEP typically requires that clean fill must be certified by laboratory analysis for VOCs, SVOCs, Metals, PCBs and Pesticides at a sample frequency of 1 sample per 250 cubic yards of material. Results are submitted to NYCDEP for approval prior to import to the Site.
- If NYCDEP becomes involved in the site redevelopment, a Deed Restriction may be required for the property to ensure that future site intrusive construction or maintenance work will include the practices described above to prevent accidental exposure to contaminants.



6.0 STATEMENT OF LIMITATIONS

The data presented and the opinions expressed in this report are qualified as stated in the attachment to this section of the report.

Robert Kreuzer
Senior Associate

Stephen Frank
Senior Geologist

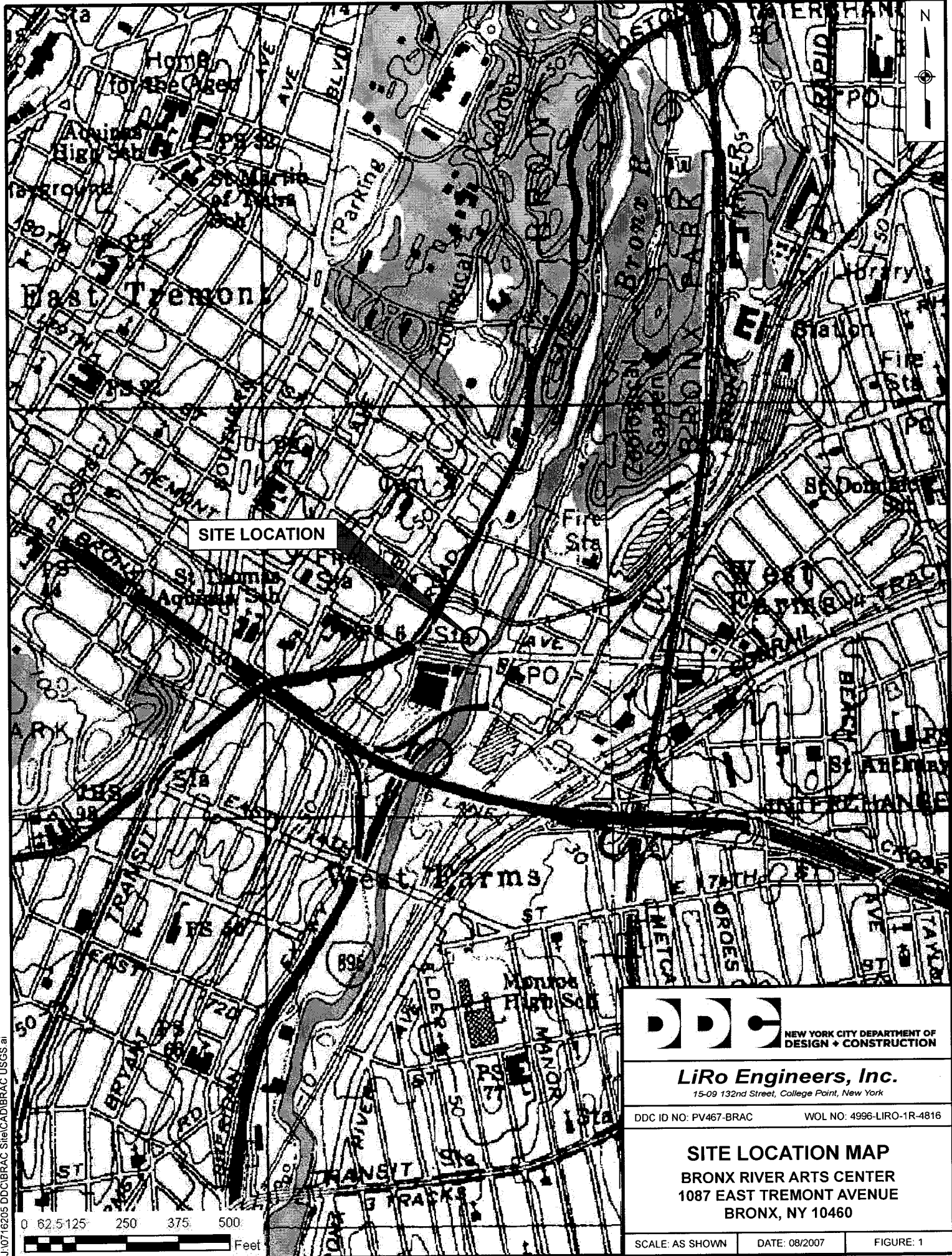
STATEMENT OF LIMITATIONS

The data presented and the opinions expressed in this report are qualified as follows:

1. The sole purpose of the investigation and of this report is to assess the physical characteristics of the Site with respect to the presence or absence in the environment of oil or hazardous materials and substances as defined in the applicable state and federal environmental laws and regulations and to gather information regarding current and past environmental conditions at the Site.
2. LiRo Engineers, Inc. (LiRo) derived the data in this report primarily from visual inspections, examination of records in the public domain, interviews with individuals with information about the Site, and a limited number of subsurface explorations made on the dates indicated. The passage of time, manifestation of latent conditions or occurrence of future events may require further exploration at the Site, analysis of the data, and reevaluation of the findings, observations, and conclusions expressed in the report.
3. In preparing this report, LiRo has relied upon and presumed accurate certain information (or the absence thereof) about the Site and adjacent properties provided by governmental officials and agencies, the Client, and others identified herein. Except as otherwise stated in the report, LiRo has not attempted to verify the accuracy or completeness of any such information.
4. The data reported and the findings, observations, and conclusions expressed in the report are limited by the Scope of Services, including the extent of subsurface exploration and other tests. The Scope of Services, was defined by the requests of the Client, the time and budgetary constraints imposed by the Client, and the availability of access to the Site.
5. Because of the limitations stated above, the findings, observations, and conclusions expressed by LiRo in this report are not, and should not be considered, an opinion concerning the compliance of any past or present owner or operator of the Site with any federal, state or local law or regulation. No warranty or guarantee, whether express or implied, is made with respect to the data reported or findings, observations, and conclusions expressed in this report. Further, such data, findings, observations, and conclusions are based solely upon Site conditions in existence at the time of investigation.

6. This report has been prepared on behalf of and for the exclusive use of the Client, and is subject to and issued in connection with the Agreement and the provisions thereof.

FIGURES



SITE LOCATION



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

LiRo Engineers, Inc.

15-09 132nd Street, College Point, New York

DDC ID NO: PV467-BRAC

WOL NO: 4996-LIRO-1R-4816

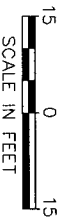
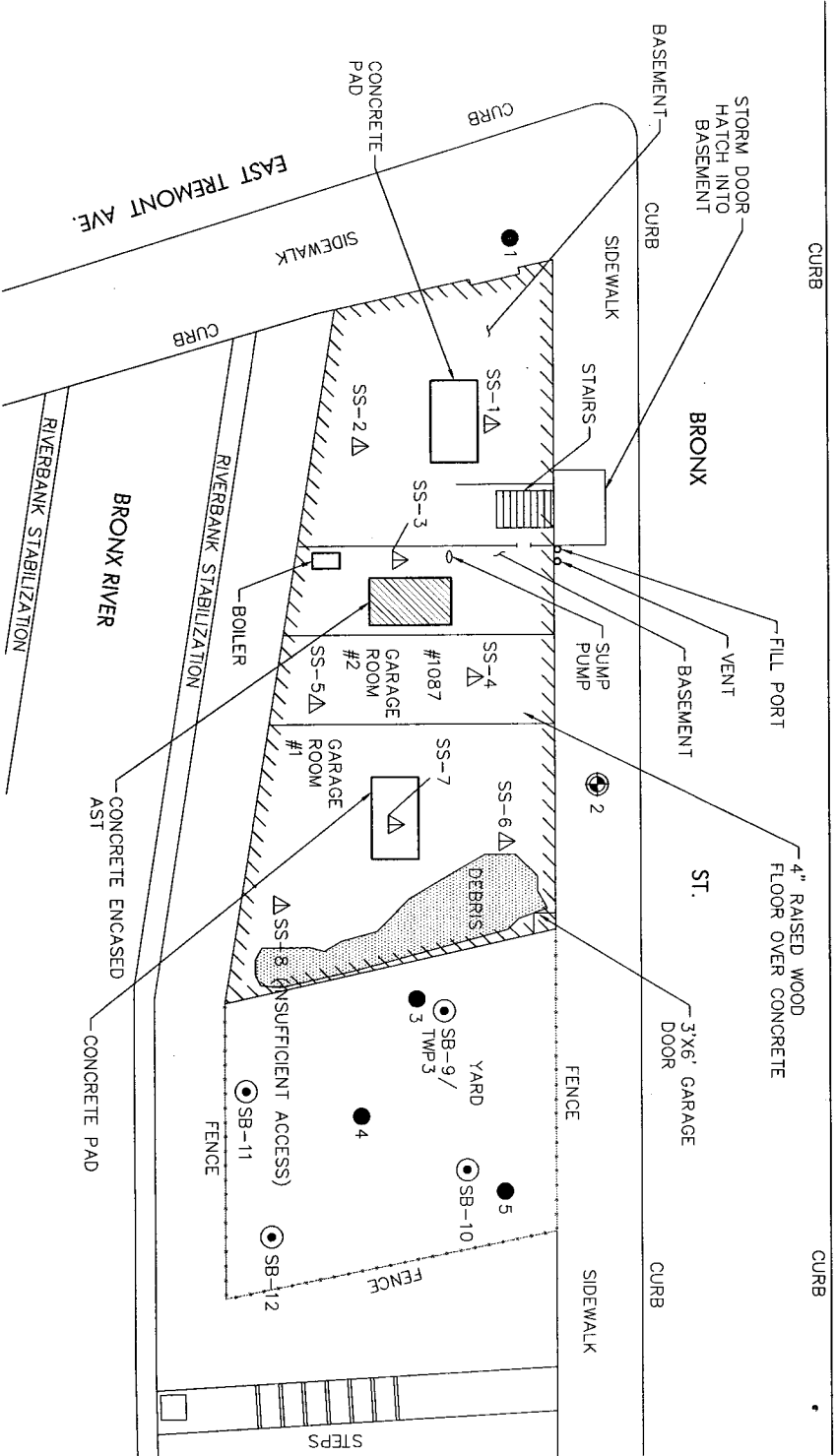
SITE LOCATION MAP

BRONX RIVER ARTS CENTER
1087 EAST TREMONT AVENUE
BRONX, NY 10460

SCALE: AS SHOWN

DATE: 08/2007

FIGURE: 1



LEGEND	
△	SPLIT SPOON BORING
●	SOIL BORING
⊕	EXISTING MONITORING WELL
●	PREVIOUS SOIL BORING



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Liro Engineers, Inc.
15-09 132nd Street, College Point, New York

DDC ID NO: PY457-BRAC WOL NO: 4996-LIRO-1R-4816

SAMPLE LOCATION PLAN

BRONX RIVER ARTS CENTER
1087 EAST TREMONT AVENUE
BRONX, NY 10460

SCALE: AS SHOWN DATE: 08/2007 FIGURE: 2

TABLES



NEW YORK CITY DEPARTMENT OF
DESIGN + CONSTRUCTION

Limited Phase II ESI -
Bronx River Arts Center - 1087 East Tremont Avenue, Bronx, New York

Table 1. Environmental Boring Data

Area	Date	Specific Location	Boring					Observations and Remarks
			ID	E.O.B. Depth +	Grab Sample Interval +	Highest PID ++	Groundwater Collected?	
1087 East Tremont Avenue	8/20/2007	See Figure 2	SS1	6	5-5.5	0	No	No evidence of contamination
	8/20/2007	See Figure 2	SS2	6	5-5.5	0	No	No evidence of contamination
	8/20/2007	See Figure 2	SS3	6	5-5.5	0	No	No evidence of contamination
	8/20/2007	See Figure 2	SS4	6	5-5.5	0	No	No evidence of contamination
	8/20/2007	See Figure 2	SS5	6	5-5.5	0	No	No evidence of contamination
	8/20/2007	See Figure 2	SS6	6	5-5.5	0	No	No evidence of contamination
	8/20/2007	See Figure 2	SS7	6	5-5.5	0	No	No evidence of contamination
	8/17/2007	See Figure 2	SB9/TWP3	19	16.5-17	51	Yes	
	8/17/2007	See Figure 2	SB10	19	11-11.5	0	No	No evidence of contamination
	8/17/2007	See Figure 2	SB11	19	10.5-11	0	No	No evidence of contamination
	8/17/2007	See Figure 2	SB12	19	11-11.5	0	No	No evidence of contamination

Notes:

1. Grab samples were subjected to VOC analysis. The whole column composite samples were subjected to SVOC and TAL Metals analyses.

+ in feet below ground surface

++ in parts per million

E.O.B. = End of Boring

LiRo Engineers, Inc.

DDC Project Number: PV467-BRAC

September 24, 2007

Work Order Letter No. 4996-LIRO-1R-4816

Table 2. Summary of TCL VOCs Detected in Soil

VOC	NYSDEC TAGM Recommended Soil Clean-up Objective	Boring Number and Date Collected											
		8/20/07	8/20/07	8/20/07	8/20/07	8/20/07	8/20/07	8/20/07	8/20/07	8/20/07	8/17/07	8/17/07	8/17/07
Acetone	200	SS1	SS2	SS3	SS4	SS5	SS6	SS7	SS9	SS10	SB9	SB10	SB11
Methylene Chloride	100	17	46 B	530 J	50	51	46	24	2.3 JB	4.4 JB	7.6	5.7	6
Isopropylbenzene	2,300	6.4 B	6.1 B	ND	7.7 B	6.8 B	8.6 B	5.6 B	7.6	5.7	28	ND	ND
n-Propylbenzene	3,700	ND	ND	ND	14	ND	ND	ND	31	ND	31	ND	ND
tert-Butylbenzene	10,000	ND	ND	ND	41	1.4	ND	ND	43	ND	43	ND	ND
sec-Butylbenzene	10,000	ND	ND	65	ND	ND	ND	ND	120 E	ND	ND	ND	ND
n-Butylbenzene	10,000	ND	ND	63	58	ND	ND	ND	34	ND	34	ND	ND
naphthalene	13,000	ND	ND	ND	15	3.8	11	ND	1.4	ND	1.4	ND	ND
Total VOCs	10000	23.4	52.1	729	225.7	63	65.6	29.6	267.3	10.1	13.9	10.1	6.7

Notes:

All concentrations are reported in parts per billion (ppb or ug/kg)

ND = Compound not detected above method detection limit (see attached lab report for mdl's)

NS = No Standard

SB = Site Background Concentration

J = Compound detected below quantitation limit

B = Compound detected in the method detection blank

BOLD = Concentration exceeds NYSDEC Technical and Administrative Guidance Memorandum (TAGM #4046)

Recommended Soil Cleanup Objectives (RSCO)

LiRo Engineers, Inc.

DDC Project Number: PV467-BRAC

September 24, 2007

Work Order Letter No. 4996-LIRO-1R-4816



NEW YORK CITY DEPARTMENT OF
ENVIRONMENTAL PROTECTION

Limited Phase II ESI -
Bronx River Arts Center - 1087 East Tremont Avenue, Bronx, New York

Table 3. Summary of TCL SVOCs Detected in Soil

SVOC	NYSDEC TAGM 4046 Recommended Soil Clean-up Objective	Boring Number and Date Collected											
		8/20/07	8/20/07	8/20/07	8/20/07	8/20/07	8/20/07	8/20/07	8/17/07	8/17/07	8/17/07	8/17/07	8/17/07
		SS1	SS2	SS3	SS4	SS5	SS6	SS7	SB9	SB10	SB11	SB12	
2-Methylnaphthalene	36,400	ND	ND	ND	ND	ND	66	ND	58 JB	60 JB	970	ND	ND
3+4-Methylphenol	NA	ND	ND	ND	ND	ND	190 J	ND	ND	ND	ND	ND	ND
Acenaphthylene	41,000	ND	53	ND	ND	ND	330	69	150	23	210	34	34
Acenaphthene	50,000	ND	13	240	170	ND	97	36	13 J	ND	26	ND	ND
Dibenzofuran	6,200	ND	ND	170 J	ND	ND	54 J	19 J	ND	ND	30 J	ND	ND
Fluorene	50,000	ND	ND	470	380	ND	95	33	15 J	ND	32	ND	ND
Phenanthrene	50,000	36	150	870	740	25	1400	600	290	110	560	55	55
Anthracene	50,000	ND	48	120	73	ND	560	140	120	33	95	19	19
Carbazole	NA	ND	29 J	ND	ND	ND	140 J	70 J	31 J	ND	88	ND	ND
Di-n-butylphthalate	8,100	61 JB	75 JB	ND	ND	59 JB	ND	56 JB	58 JB	60 JB	70 JB	60 JB	60 JB
Fluoranthene	50,000	94	340	53	28	59	4300	1300	1300	310	1200	190	190
Pyrene	50,000	98	340	140	110	63	3100	1200	1100	300	830	180	180
Benzo(a)anthracene	224	51	190	15 J	39 J	29	1900	630	630	190	320	120	120
Chrysene	400	54	190	34	ND	31	1800	620	540	190	400	130	130
Bis(2-ethylhexyl)phthalate	50,000	150 J	200	48 J	ND	54 J	ND	32 J	24 J	37 J	98 J	36 J	36 J
Benzo(b)fluoranthene	1,100	79	160	ND	ND	57	2200 D	480	460	170	380	140	140
Benzo(k)fluoranthene	1,100	45	150	ND	ND	26	830 D	420	540	160	380	110	110
Benzo(a)pyrene	61	75	190	810	ND	53	1600	590	630	210	370	150	150
Indeno(1,2,3-cd)pyrene	3,200	14 J	150	ND	ND	ND	790	480	400	130	300	94	94
Benzo(ghi)perylene	50,000	43	220	ND	ND	22	1000	570	450	180	340	150	150
Butylbenzylphthalate	50,000	130 J	180 J	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibenz(a,h)anthracene	14.3	12 J	62	ND	ND	ND	280	ND	ND	ND	ND	ND	ND
Benzoic Acid	NA	ND	270 J	ND	ND	ND	610	ND	ND	ND	ND	ND	ND
Naphthalene	13,000	ND	ND	ND	ND	ND	42	9.4	ND	ND	ND	ND	ND
Total SVOCs	500,000	942	3,010	2,970	1,540	478	22,984	7,354	6,809	2,163	6,699	1,468	1,468

Notes:

Composite soil samples for SVOC analysis were prepared by mixing the soil from the entire column

All concentrations are reported in parts per billion (ppb or ug/kg)

ND = Compound not detected above method detection limit (see attached lab report for mdl's)

NA = Not Applicable

D = Dilution

SB = Site Background Concentration

J = Compound detected below quantitation limit

B = Analyte detected in the method detection blank

BOLD = Concentration exceeds NYSDCE Technical and Administrative Guidance Memorandum (TAGM #4046)

Recommended Soil Cleanup Objectives (RSCO)

LIRo Engineers, Inc.

DDC Project Number: PV467-BRAC

Work Order Letter No. 4996-LIRO-1R-4816

September 24, 2007

Table 4. Summary of TAL Metals Detected in Soil

Target Analyte List Metals	Recommended Soil Clean-up Objective	Eastern USA Soil Background	Boring Number and Date Collected											
			8/20/07	8/20/07	8/20/07	8/20/07	8/20/07	8/20/07	8/20/07	8/20/07	8/17/07	8/17/07	8/17/07	8/17/07
Aluminum	SB	33000	SS1	SS2	SS3	SS4	SS5	SS6	SS7	SB9	SB10	SB11	SB12	
Antimony	SB	NS	5900	5300	3700	5500	6700	5500	10000	5700	3600	6600	8900	
Arsenic	7.5 or SB	3 - 12	4.7	6.4	<2.0	2.2	2.6	56	3.7	<1.8	<1.9	<2.0	<2.0	
Barium	300 or SB	15 - 600	<0.72	<0.73	<0.78	<0.75	<0.70	<0.76	<0.79	<0.73	<0.78	<0.79	<0.8	
Beryllium	0.16 or SB	0.1-1.75	62	100	15	14	48	300	160	140	21	59	85	
Cadmium	1 or SB	0.1-1	<0.36	<0.36	<0.39	<0.37	<0.35	<0.38	<0.40	<0.36	<0.39	<0.39	<0.4	
Calcium	SB	130 - 35,000	0.7	1.2	<0.39	<0.37	<0.35	2.1	<0.40	1.1	<0.39	0.61	<0.4	
Chromium	10 or SB	1.5 - 40	15000	14000	340	450	1800	8500	2800	3100	400	2000	1600	
Cobalt	30 or SB	2.5 - 60	14	14	8.3	12	16	18	24	8.2	4.1	8.3	10	
Copper	25 or SB	1 - 50	69	37	2.5	3.7	4.7	4	8	4.3	2.8	5.2	5.8	
Iron	2,000 or SB	2,000 - 550,000	15000	14000	7100	12000	13000	18000	22000	11000	8400	13000	19000	
Lead	SB	500*	330	340	<0.98	<0.93	91	2100	220	110	14	200	170	
Magnesium	SB	100 - 5,000	9300	4900	1400	2300	2400	1200	4000	1900	930	1900	3100	
Manganese	SB	50 - 5,000	210	210	56	98	180	170	460	170	190	230	250	
Nickel	13 or SB	5 - 25	7.7	8	4.3	6.5	9.7	10	14	10	7.1	11	12	
Potassium	SB	8,500 - 43,000	760	1500	420	420	990	1400	3900	860	700	820	1700	
Selenium	2 or SB	0.1-3.9	<1.8	<1.8	<2.0	<1.9	<1.7	<1.9	<2.0	<1.8	<1.9	<2.0	<2.0	
Silver	SB	NS	2.5	2.9	1.3	1.5	1.5	2.1	13	2.2	1	2.4	3	
Sodium	SB	6000-8000	160	210	110	130	140	250	510	<91	<97	<98	100	
Thallium	SB	NS	<0.91	<0.91	<0.98	<0.93	<0.87	<0.95	<0.99	<0.91	<0.97	<0.98	<0.99	
Vanadium	150 or SB	1 - 300	14	15	8.1	13	17	15	28	15	10	17	20	
Zinc	20 or SB	9 - 50	300	140	15	22	56	1300	180	3600	31	210	110	
Mercury	0.1	0.001 - 0.2	0.46	2.8	<0.025	<0.022	3.8	1.8	0.3	0.21	0.038	2.3	0.45	

Notes:

Composite soil samples for TAL Metals analysis were prepared by mixing the soil from the entire column

All concentrations are reported in parts per million (ppm or mg/kg)

RP = Results Pending

ND = Compound not detected above method detection limit (see attached lab report for mdl's)

NS = No Standard

SB = Site Background Concentration

BOLD = Concentration exceeds NYSDC Technical and Administrative Guidance Memorandum (TAGM #4046)

Recommended Soil Cleanup Objectives (RSCO)

UNDERLINE = Detected concentration exceeds Eastern USA Soil Background

*Background levels for lead vary widely. Average levels in undeveloped, rural areas may range from 4-61 ppm. Average background levels in metropolitan or suburban areas or near highways are much higher and typically range from 200 - 500 ppm.

LiRo Engineers, Inc.

DDC Project Number: PV467-BRAC

September 24, 2007
Work Order Letter No. 4996-LIRO-1R-4816

Table 5. Summary of VOCs Detected in Groundwater

VOCs	NYSDEC Groundwater Quality Standards and Guidance Values June 1998 Ambient Water Quality Standards for Class GA Groundwater	Boring Number and Date Collected	
		8/17/07	8/20/07
		TWP-3	monitoring well 2 (TWP-4)
Acetone	50	2.6 J	2.2 J
Methylene Chloride	5	2.3 B	2.0 B
Methyl tert-butyl ether	10	ND	ND
Ethyl Benzene	5	ND	ND
m + p Xylene	5	ND	ND
o Xylene	5	ND	ND
cis-1,2-Dichloroethene	5	1.5	ND
Isopropylbenzene	5	9.5	ND
n-Propylbenzene	5	7.6	ND
135-Trimethylbenzene	5	ND	ND
124-Trimethylbenzene	5	ND	ND
tert-Butylbenzene	5	9.1	ND
sec-Butylbenzene	5	18	ND
4-Isopropyltoluene	5	15	ND
Napthalene	10	ND	ND

All concentrations are reported in parts per billion (ppb or ug/L)

RP = Results Pending

ND = Compound not detected above method detection limit (see attached lab report for mdl's)

NS = No Standard

SB = Site Background Concentration

BOLD = Concentration exceeds NYSDEC Groundwater Quality Standards

Table 6. Summary of SVOCs Detected in Groundwater

SVOCs	NYSDEC Groundwater Quality Standards and Guidance Values June 1998 Ambient Water Quality Standards for Class GA Groundwater	Boring Number and Date Collected	
		8/17/07	8/20/07
		TWP-3	monitoring well 2 (TWP-4)
Acenaphthylene	NS	0.48	ND
Acenaphthene	20	ND	ND
Fluorene	50	ND	ND
Pentachlorophenol	1	ND	ND
Phenanthrene	50	1.4	0.72
Benzo(a)anthracene	0.002	1.7	0.83
Chrysene	0.002	1.4	0.81
Benzo(b)fluoranthene	0.002	2.3	4.8
Benzo(k)fluoranthene	0.002	1.2	0.8
Benzo(a)pyrene	NS	2.3	4.8
Indeno(1,2,3-cd)pyrene	0.002	ND	2
Benzo(g,h,i)perylene	NS	0.92	1.3
bis(2-Ethylhexyl)phthalate	5	ND	14
Naphthalene	10	ND	0.46
Fluoranthene	50	4.8	1.3
Pyrene	50	4.3	300

All concentrations are reported in parts per billion (ppb or ug/L)

RP = Results Pending

ND = Compound not detected above method detection limit (see attached lab report for mdl's)

NS = No Standard

SB = Site Background Concentration

BOLD = Concentration exceeds NYSDEC Groundwater Quality Standards

Table 7. Summary of TAL Metals Detected in Groundwater

TAL Metals	NYSDEC Groundwater Quality Standards and Guidance Values June 1998 Ambient Water Quality Standards for Class GA Groundwater	Boring Number and Date Collected	
		8/17/07	8/20/07
		TWP-3	monitoring well 2 (TWP-4)
Aluminum	NS	310	260
Antimony as Sb	3	0.041	<0.02
Arsenic as As	0.025	4.7	<0.008
Barium	1	3.3	5.6
Beryllium as Be	0.003	0.01	0.0012
Cadmium as Cd	0.005	0.04	0.0087
Calcium	NS	800	550
Chromium as Cr	0.05	0.61	0.68
Cobalt	NS	0.32	0.3
Copper as Cu	2	3.7	1.9
Iron	3	490	360
Lead as Pb	0.025	14	1.8
Magnesium	35	110	98
Manganese	0.3	22	18
Mercury as Hg	0.0007	0.02	0.0066
Nickel as Ni	0.1	0.51	0.43
Potassium	NS	67	52
Selenium as Se	0.01	<0.02	<0.02
Silver as Ag	0.05	0.09	0.028
Sodium	20	110	99
Thallium as Tl	0.0005	<0.01	<0.01
Vanadium	NS	0.6	0.43
Zinc as Zn	2	31	1.1

All concentrations are reported in parts per million (ppm or mg/L)

RP = Results Pending

ND = Compound not detected above method detection limit (see attached lab report for mdl's)

NS = No Standard

SB = Site Background Concentration

BOLD = Concentration exceeds NYSDEC Groundwater Quality Standards

APPENDIX A

Geologic Boring Logs

LiRo Engineers, Inc.										BORING NO. <u>SS-1</u>	
PROJECT <u>Bronx River Art Center</u>										SHEET: <u>1 of 1</u>	
CLIENT <u>NYC DDC</u>										JOB NO:	
BORING CONTRACTOR <u>ADT</u>										BORING LOCATION:	
GROUNDWATER <u>Not Encountered</u>										GROUND ELEVATION:	
DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE	DATE STARTED: <u>8/20/07</u>		
				DIA.					DATE FINISHED: <u>8/20/07</u>		
				WT.					DRILLER: <u>Vici R</u>		
				FALL					GEOLOGIST: <u>Mark Chi</u>		
* POCKET PENETROMETER READING										REVIEWED BY:	

DEPTH	STRATA	SAMPLE				RECOVERY RQD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	REMARKS	
		NO.	TYPE	BLOWS PRR 6"							END	NOTES
		S1	SS			70%	Black		Fill Material F-M Sand		O PID	
		S2	SS			60%	Dark Brown		F-M Sand			
5		S3	SS			60%	Dark Brown		F-M Sand		O PID	
									End of Boring			
10												
15												
20												
25												
30												
35												

COMMENTS: Sampled collected at 5-5.5 feet

PROJECT NO.: Bronx River Art Center

BORING NO.: SS-1

DDC ID NO: PV467-BRAC

WOL NO: 4996-LIRO-IR-4816

LiRo Engineers, Inc.										BORING NO. <u>SS-2</u>	
PROJECT <u>Bronx River Art Center</u>										SHEET: <u>1 of 1</u>	
CLIENT <u>NYC DDC</u>										JOB NO:	
BORING CONTRACTOR <u>ADT</u>										BORING LOCATION:	
GROUNDWATER <u>NOT Encountered</u>										GROUND ELEVATION:	
DATE	TIME	LEVEL	TYPE		TYPE	CAS.	SAMPLER	CORE	TUBE	DATE STARTED: <u>8/20/07</u>	
					DIA.					DATE FINISHED: <u>8/20/07</u>	
					WT.					DRILLER: <u>Vici R</u>	
					FALL					GEOLOGIST: <u>Mark Chin</u>	
* POCKET PENETROMETER READING										REVIEWED BY:	

DEPTH	STRATA	SAMPLE				DESCRIPTION				CLASS USCS	REMARKS	
		NO.	TYPE	BLOWS PER 6"	RECOVERY RQD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	FW		moisture	
		S1	SS		80%	Black		Fill Material F-M Sand			0 PID	
		S2	SS		70%	Black		F-M Sand				
5		S3	SS		50%	Black		F-M Sand			0 PID	
								End of Boring				
10												
15												
20												
25												
30												
35												

COMMENTS: Sampled collected at 5-5.5 feet

PROJECT NO.: Bronx River Art Center BORING NO.: SS-2

DDC ID NO: PV467-BRAL

WOL NO: 4996-LIRO-IR-4816

LiRo Engineers, Inc.										BORING NO. SS-3	
PROJECT Bront River Art Center										SHEET: 1 of 1	
CLIENT NYC DDC										JOB NO:	
BORING CONTRACTOR ADT										BORING LOCATION:	
GROUNDWATER Not Encountered										GROUND ELEVATION:	
DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE	DATE-STARTED:	8/20/07	
				DIA.					DATE FINISHED:	8/20/07	
				WT.					DRILLER:	Viri R	
				FAIL					GEOLOGIST:	Mark Chin	
* POCKET PENETROMETER READING										REVIEWED BY:	

DEPTH	STRATA	SAMPLE				RECOVERY RQD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	REMARKS PID moisture
		NO.	TYPE	BLOWS PER 6"							
		S1	SS			70%	Black		Fill Material F-M Sand		0 PID
		S2	SS			60%	Dark Brown		F-M Sand some Silt		
5		S3	SS			70%	Dark Brown		F-M Sand some Silt		0 PID
									End of Boring		
10											
15											
20											
25											
30											
35											

COMMENTS: Sampled collected at 5-5.5 feet

PROJECT NO.: Bront River Art Center

BORING NO.: SS-3

DDC ID NO: PV467-BRAC

WOL NO: 4996-LIRO-IR-4816

LiRo Engineers, Inc.										BORING NO. SS-4	
PROJECT Brone River Art Center										SHEET: 1 of 1	
CLIENT NYC DDC										JOB NO:	
BORING CONTRACTOR ADT										BORING LOCATION:	
GROUNDWATER Not Encountered										GROUND ELEVATION:	
DATE	TIME	LÉVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE	DATE STARTED: 8/20/07		
				DIA.					DATE FINISHED: 8/20/07		
				WT.					DRILLER: Viri K		
				FALL					GEOLOGIST: Mark Chin		
* POCKET PENETROMETER READING										REVIEWED BY:	

DEPTH	STRATA	SAMPLE				DESCRIPTION				CLASS USCS	REMARKS PID moisture
		NO.	TYPE	BLOWS PR 6"	RECOVERY RQD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION			
		51	SS		50%	Black		Fill Material F-M Sand		0 PID	
		52	SS		60%	Black		F-M Sand some Silt			
5		53	SS		80%	Black		F-M Sand some Silt.		0 PID	
								End of Boring			
10											
15											
20											
25											
30											
35											

COMMENTS: **Sample collected at 5-5.5 feet**

PROJECT NO.: **Brone River Art Center** BORING NO.: **SS-4**

DDC ID NO: PV467-BRAC

WOL NO: 4996-LIRO-IR-4816

LiRo Engineers, Inc.										BORING NO. <u>SS-5</u>	
PROJECT <u>Bronx River Art Center</u>										SHEET: <u>1 of 1</u>	
CLIENT <u>NYC DDC</u>										JOB NO:	
BORING CONTRACTOR <u>ADT</u>										BORING LOCATION:	
GROUNDWATER <u>NOT Encountered</u>										GROUND ELEVATION:	
DATE	TIME	LEVEL	TYPE		TYPE	CAS.	SAMPLER	CORE	TUBE	DATE STARTED:	<u>8/20/07</u>
					DIA.					DATE FINISHED:	<u>8/20/07</u>
					WT.					DRILLER:	<u>Viri K</u>
					FALL					GEOLOGIST:	<u>Mark Chin</u>
* POCKET PENETROMETER READING										REVIEWED BY:	

DEPTH	STRATA	SAMPLE				RECOVERY RQD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	REMARKS FID moisture
		NO.	TYPE	BLOWS PER 6"							
		S1	SS			70%	Black		Fill Material F-M Sand		0 PID
		S2	SS			70%	Black		F-M Sand		
5		S3	SS			50%	Black		F-M Sand		0 PID
									End of Boring		
10											
15											
20											
25											
30											
35											

COMMENTS: Sampled collected at 5-5.5 feet

PROJECT NO.: Bronx River Art Center

BORING NO.: SS-5

DDC ID NO: PV467-BRAC

WOL NO: 4996-LIRO-1R-4816

LiRo Engineers, Inc.										BORING NO. 55-6	
PROJECT Brong River Art Center										SHEET: 1 of 1	
CLIENT NYC DDC										JOB NO:	
BORING CONTRACTOR ADT										BORING LOCATION:	
GROUNDWATER Not Encountered										GROUND ELEVATION:	
DATE	TIME	LEVEL	TYPE		TYPE	CAS.	SAMPLER	CORE	TUBE	DATE-STARTED: 8/20/07	
					DIA.					DATE FINISHED: 8/20/07	
					WT.					DRILLER: Jeri R	
					FALL					GEOLOGIST: Mark Chin	
* POCKET PENETROMETER READING										REVIEWED BY:	

DEPTH	STRATA	SAMPLE				DESCRIPTION				CLASS USCS	REMARKS PID moisture
		NO.	TYPE	BLOWS PER 6"	RECOVERY RQD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION			
		S1	SS		80%	Black		Fill Material F-M Sand		0 PID	
		S2	SS		70%	Dark Brown		F-M Sand some Silt			
5		S3	SS		90%	Dark Brown		F-M Sand some Silt		0 PID	
								End of Boring			
10											
15											
20											
25											
30											
35											

COMMENTS: Sampled collected at 5-5.5 feet

PROJECT NO.: Brong River Art Center
BORING NO.: 55-6

DAC ID NO: PV467-BRAC

WOL NO: 4996-LIRO-1R-4816

LiRo Engineers, Inc.										BORING NO. <u>SS-7</u>	
PROJECT <u>Bronx River Art Center</u>										SHEET: <u>1 of 1</u>	
CLIENT <u>NYC DDC</u>										JOB NO:	
BORING CONTRACTOR <u>ADT</u>										BORING LOCATION:	
GROUNDWATER <u>Not Encountered</u>										GROUND ELEVATION:	
DATE	TIME	LEVEL	TYPE		TYPE	CAS.	SAMPLER	CORE	TUBE	DATE STARTED: <u>8/20/07</u>	
					DIA.					DATE FINISHED: <u>8/20/07</u>	
					WT.					DRILLER: <u>Vici R</u>	
					FALL					GEOLOGIST: <u>Mark Chin</u>	
* POCKET PENETROMETER READING										REVIEWED BY:	

DEPTH	STRATA	SAMPLE				DESCRIPTION				CLASS USCS	REMARKS	
		NO.	TYPE	BLOWS PER 6"	RECOVERY RQD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	PH		moisture	
		51	SS		70%	Dark Brown		Fill Material F-M Sand			0 PID	
		52	SS		80%	Dark Brown		F-M Sand some Silt				
5		53	SS		70%	Dark Brown		F-M Sand some Silt			0 PID	
								End of Boring				
10												
15												
20												
25												
30												
35												

COMMENTS: Sampled collected at 5-5.5 feet

PROJECT NO.: Bronx River Art Center

BORING NO.: SS-7

DDC ID NO. PV467-BRAC

WOL NO. 4996-LIRO-1R-4816

LiRo Engineers, Inc.												BORING NO. <u>SB-9</u>	
PROJECT <u>Bronx River Art Center</u>												SHEET: <u>1 of 1</u>	
CLIENT <u>NYC DDC</u>												JOB NO:	
BORING CONTRACTOR <u>ADT</u>												BORING LOCATION:	
GROUNDWATER <u>14.7 ft</u>												GROUND ELEVATION:	
DATE	TIME	LEVEL	TYPE		TYPE	CAS.	SAMPLER	CORE	TUBE	DATE STARTED: <u>8/17/07</u>			
					DIA.					DATE FINISHED: <u>8/17/07</u>			
					WT.					DRILLER: <u>Jill K</u>			
					FALL					GEOLOGIST: <u>Mark Chin</u>			
* POCKET PENETROMETER READING												REVIEWED BY:	

DEPTH	STRATA	SAMPLE				RECOVERY RQD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	REMARKS	
		NO.	TYPE	BLOWS PER 6"							PIU	moisture
						90%	Red Brown		Fill Material F-M Sand Some silt		0 PID	
5						80%	Red Brown		F-M Sand Some silt		20 PID	
10						76%	Red Brown		F-M Sand Some silt + Gravel		▼ 14.7	
15						70%	Red Brown		F-M Sand Some silt + Gravel		51 PID	
20									End of Boring (REFUSAL)			
25												
30												
35												

COMMENTS: Sampled taken at 16.5-17 feet

PROJECT NO.:
BORING NO.: SB9

DDC ID NO: PV467-BRAC
 WOL NO: 4996-LIRO-1R-4816

LiRo Engineers, Inc.										BORING NO. SB-10	
PROJECT Bronx River Act Center										SHEET: 1 of 1	
CLIENT NYC DDC										JOB NO:	
BORING CONTRACTOR ADT										BORING LOCATION:	
GROUNDWATER 12ft										GROUND ELEVATION:	
DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE	DATE STARTED: 8/17/07		
				DIA.					DATE FINISHED: 8/17/07		
				WT.					DRILLER: Jiri K		
				FALL					GEOLOGIST: Mark Chin		
* POCKET PENETROMETER READING										REVIEWED BY:	

DEPTH	STRATA	SAMPLE				DESCRIPTION				CLASS USCS	REMARKS	
		NO.	TYPE	BLOWS PER 6"	RECOVERY RQD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	PIU		moisture	
					90%	Red Brown		Fill Material F-M Sand Some Silt			0 PID	
5					80%	Red Brown		F-M Sand Some Silt & Gravel			0 PID	
10					90%	Red Brown		F-M Sand Some Silt			0 PID ▼ 12ft	
15					70%	Red Brown		F-M Sand Some Silt			0 PID	
20								End of Boring (REFUSAL)				
25												
30												
35												

COMMENTS: Sampled taken at 11-11.5 ft
PROJECT NO.: _____ BORING NO.: SB-10

DDC ID NO: PV467-BRAC

WOL NO: 4996-LIRO-1R-4816

LiRo Engineers, Inc.										BORING NO. SB-11			
PROJECT Bronx River Art Center										SHEET: 1 of 1			
CLIENT NYC DDC										JOB NO:			
BORING CONTRACTOR ADT										BORING LOCATION:			
GROUNDWATER 11 ft										GROUND ELEVATION:			
DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE	DATE-STARTED: 8/17/07				
				DIA.					DATE FINISHED: 8/17/07				
				WT.					DRILLER: Jiri K				
				FALL					GEOLOGIST: Mack Chia				
* POCKET PENETROMETER READING										REVIEWED BY:			
DEPTH	STRATA	SAMPLE				RECOVERY RQD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	REMARKS		
		NO.	TYPE	BLOWS PER 6"							PID	moisture	
						80%	Red Brown		Fill Material F-M Sand Some Silt		0	PID	
5						70%	Red Brown		F-M Sand		0	PID	
10						70%	Red Brown		F-M Sand Some Silt		▼ 11 ft	0	PID
15						70%	Red Brown		F-M Sand Some Silt			0	PID
20									End of Boring (REFUSAL)				
25													
30													
35													

COMMENTS: Sampled taken at 10.5 - 11 feet

PROJECT NO.:
BORING NO.: SB-11

DDC ID NO: PV467-BRAC
 WOL NO: 4996-LIRO-IR-4816

LiRo Engineers, Inc.										BORING NO. SB-12	
PROJECT Bronx River Art Center										SHEET: 1 of 1	
CLIENT NYC DDC										JOB NO:	
BORING CONTRACTOR ADT										BORING LOCATION:	
GROUNDWATER 11 ft										GROUND ELEVATION:	
DATE	TIME	LEVEL	TYPE	TYPE	CAS.	SAMPLER	CORE	TUBE	DATE STARTED: 8/17/07		
				DIA.					DATE FINISHED: 8/17/07		
				WT.					DRILLER: Jiri K		
				FALL					GEOLOGIST: Mack Chia		
* POCKET PENETROMETER READING										REVIEWED BY:	

DEPTH	STRATA	SAMPLE				RECOVERY RQD %	COLOR	CONSISTENCY HARDNESS	MATERIAL DESCRIPTION	CLASS USCS	REMARKS	
		NO.	TYPE	BLOWS PER 6"							PID	moisture
						80%	Red Brown		Fill Material F-M Sand Some silt		0 PID	
5						80%	Red Brown		F-M Sand		0 PID	
10						80%	Red Brown		F-M Sand		0 PID	
15						70%	Red Brown		F-M Sand Some silt		0 PID	
20									End of Boring (REFUSAL)			
25												
30												
35												

COMMENTS: **Sampled taken at 11 - 11.5 feet**

PROJECT NO.:

BORING NO.: **SB-12**

DDC ID NO: PV467-BRAC
 WOL NO: 4996-LIRO-1R-4816

APPENDIX B

Laboratory Report Forms

EMSL Analytical

<http://www.emsl.com>

3 Cooper St.
Westmont, NJ 08108
Phone: (856) 858-4800
Fax: 8568584571

Attn: **Robert Kreuzer**
Liro Group
690 Delaware Avenue
Buffalo, NY 14209

8/23/2007

Phone (716) 882-5476
Fax: (716) 882-9640

The following report covers the analysis performed on samples submitted to EMSL Analytical on 8/20/2007. The results are tabulated on the attached data pages for the following client designated project:

Project ID: Bronx River Art Center

The reference number for these samples is EMSL Order #010703726. Please use this reference when calling about these samples.

If you have any questions, please do not hesitate to contact me at (856) 858-4800.

Reviewed and Approved By:

Laboratory Director or other
approved signatory
NJ-NELAP Accredited:04653



The test results contained within this report meet the requirements of NELAP and/or the specific certification program that is applicable, unless otherwise noted.

**EMSL Analytical**

3 Cooper St., Westmont, NJ 08108

Phone: (856) 858-4800 Fax: (856) 858-4571 Email: jsmith@emsl.com



SM

Attn: **Robert Kreuzer**
Liro Group
690 Delaware Avenue
Buffalo, NY 14209

Fax: (716) 882-9640

Phone: (716) 882-5476

Customer ID: LIRO50

Customer PO:

Received: 08/20/07 8:56 AM

EMSL Order: 010703726

EMSL Proj: Bronx River Art Center

Report Date: 8/23/2007

Client Sample Description SB-9 / TWP-3, Grab**Collected:** 8/17/2007**Lab ID:** 0001

<i>Test</i>	<i>Method</i>	<i>Parameter</i>	<i>Concentration</i>	<i>Units</i>	<i>RL</i>	<i>Analysis Date/Time</i>	<i>Analyst</i>
C-Total Solids	2540B	Total Solids	88	%	0.50	8/21/2007 12:30 PM	tlech
VOA	8260B	See Attached			N/A	8/20/2007 01:16 PM	wfink

Sample failed Surrogate criteria, confirmed failure due to matrix interference.

**EMSL Analytical**

3 Cooper St., Westmont, NJ 08108

Phone: (856) 858-4800 Fax: (856) 858-4571 Email: jsmith@emsl.com



Attn: **Robert Kreuzer**
Liro Group
690 Delaware Avenue
Buffalo, NY 14209

Fax: (716) 882-9640

Phone: (716) 882-5476

Customer ID: LIRO50
Customer PO:
Received: 08/20/07 8:56 AM
EMSL Order: 010703726

EMSL Proj: Bronx River Art Center

Report Date: 8/23/2007

Client Sample Description			Collected: 8/17/2007		Lab ID: 0002		
Test	Method	Parameter	Concentration	Units	RL	Analysis Date/Time	Analyst
C-Total Solids	2540B	Total Solids	87	%	0.50	8/21/2007 12:30 PM	tlech
C-TAL Metals-C-Metals by ICP	6010B	Aluminum	5700	mg/Kg	9.1	8/22/2007 09:20 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Antimony	<1.8	mg/Kg	1.8	8/22/2007 09:20 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Arsenic	<0.73	mg/Kg	0.73	8/22/2007 09:20 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Barium	140	mg/Kg	9.1	8/22/2007 09:20 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Beryllium	<0.36	mg/Kg	0.36	8/22/2007 09:20 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Cadmium	1.1	mg/Kg	0.36	8/22/2007 09:20 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Calcium	3100	mg/Kg	91	8/22/2007 09:20 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Chromium	8.2	mg/Kg	0.91	8/22/2007 09:20 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Cobalt	4.3	mg/Kg	0.91	8/22/2007 09:20 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Copper	59	mg/Kg	1.8	8/22/2007 09:20 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Iron	11000	mg/Kg	9.1	8/22/2007 09:20 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Lead	110	mg/Kg	0.91	8/22/2007 09:20 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Magnesium-R	1900	mg/Kg	91	8/22/2007 09:20 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Manganese	170	mg/Kg	1.4	8/22/2007 09:20 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Nickel	10.0	mg/Kg	1.8	8/22/2007 09:20 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Potassium	860	mg/Kg	91	8/22/2007 09:20 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Selenium	<1.8	mg/Kg	1.8	8/22/2007 09:20 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Silver	2.2	mg/Kg	0.91	8/22/2007 09:20 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Sodium	<91	mg/Kg	91	8/22/2007 09:20 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Thallium	<0.91	mg/Kg	0.91	8/22/2007 09:20 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Vanadium	15	mg/Kg	0.91	8/22/2007 09:20 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Zinc	3600	mg/Kg	1.8	8/22/2007 09:20 PM	rferrer
C-TAL Metals-Mercury, Total	7471A	Mercury	0.21	mg/Kg	0.023	8/21/2007 01:57 PM	dhemsley
SVOA	8270C TCL	See Attached			N/A	8/21/2007 02:50 PM	eayres

**EMSL Analytical**

3 Cooper St., Westmont, NJ 08108

Phone: (856) 858-4800 Fax: (856) 858-4571 Email: jsmith@emsl.com



Attn: **Robert Kreuzer**
Liro Group
690 Delaware Avenue
Buffalo, NY 14209

Fax: (716) 882-9640

Phone: (716) 882-5476

Customer ID: LIRO50
Customer PO:
Received: 08/20/07 8:56 AM
EMSL Order: 010703726

EMSL Proj: Bronx River Art Center

Report Date: 8/23/2007

Client Sample Description SB-9 / TWP-3

Collected: 8/17/2007

Lab ID: 0003

Test	Method	Parameter	Concentration	Units	RL	Analysis Date/Time	Analyst
C-TAL Metals-C-Metals by ICP	200.7	Aluminum	310	mg/L	0.10	8/22/2007 11:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Antimony	0.041	mg/L	0.020	8/22/2007 11:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Arsenic	4.7	mg/L	0.0080	8/22/2007 11:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Barium	3.3	mg/L	0.10	8/22/2007 11:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Beryllium	0.010	mg/L	0.0040	8/22/2007 11:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Cadmium	0.040	mg/L	0.0040	8/22/2007 11:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Calcium	800	mg/L	1.0	8/22/2007 11:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Chromium	0.61	mg/L	0.010	8/22/2007 11:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Cobalt	0.32	mg/L	0.010	8/22/2007 11:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Copper	3.7	mg/L	0.020	8/22/2007 11:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Iron	490	mg/L	0.10	8/22/2007 11:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Lead	14	mg/L	0.010	8/22/2007 11:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Magnesium-R	110	mg/L	1.0	8/22/2007 11:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Manganese	22	mg/L	0.015	8/22/2007 11:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Nickel	0.51	mg/L	0.020	8/22/2007 11:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Potassium	67	mg/L	1.0	8/22/2007 11:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Selenium	<0.020	mg/L	0.020	8/22/2007 11:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Silver	0.090	mg/L	0.010	8/22/2007 11:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Sodium	110	mg/L	1.0	8/22/2007 11:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Thallium	<0.010	mg/L	0.010	8/22/2007 11:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Vanadium	0.60	mg/L	0.010	8/22/2007 11:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Zinc	31	mg/L	0.020	8/22/2007 11:36 PM	rferrer
C-TAL Metals-Mercury, Total	245.1	Hg	0.020	mg/L	0.00020	8/22/2007 10:53 AM	dhemsley
SVOA	625	See Attached			N/A	8/22/2007 01:15 PM	eayres
VOA	8260B	See Attached			N/A		

**EMSL Analytical**

3 Cooper St., Westmont, NJ 08108

Phone: (856) 858-4800 Fax: (856) 858-4571 Email: jsmith@emsl.com



Attn: **Robert Kreuzer**
Liro Group
690 Delaware Avenue
Buffalo, NY 14209

Fax: (716) 882-9640

Phone: (716) 882-5476

Customer ID: LIRO50

Customer PO:

Received: 08/20/07 8:56 AM

EMSL Order: 010703726

EMSL Proj: Bronx River Art Center

Report Date: 8/23/2007

Client Sample Description SB-10, Grab **Collected:** 8/17/2007 **Lab ID:** 0004

<i>Test</i>	<i>Method</i>	<i>Parameter</i>	<i>Concentration</i>	<i>Units</i>	<i>RL</i>	<i>Analysis Date/Time</i>	<i>Analyst</i>
C-Total Solids	2540B	Total Solids	87	%	0.50	8/21/2007 12:30 PM	tlech
VOA	8260B	See Attached			N/A	8/20/2007 02:00 PM	wfink

**EMSL Analytical**

3 Cooper St., Westmont, NJ 08108

Phone: (856) 858-4800 Fax: (856) 858-4571 Email: jsmith@emsl.com



Attn: **Robert Kreuzer**
Liro Group
690 Delaware Avenue
Buffalo, NY 14209

Fax: (716) 882-9640

Phone: (716) 882-5476

Customer ID: LIRO50

Customer PO:

Received: 08/20/07 8:56 AM

EMSL Order: 010703726

EMSL Proj: Bronx River Art Center

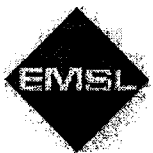
Report Date: 8/23/2007

Client Sample Description SB-10, Comp

Collected: 8/17/2007

Lab ID: 0005

Test	Method	Parameter	Concentration	Units	RL	Analysis Date/Time	Analyst
C-Total Solids	2540B	Total Solids	86	%	0.50	8/21/2007 12:30 PM	tlech
C-TAL Metals-C-Metals by ICP	6010B	Aluminum	3600	mg/Kg	9.7	8/22/2007 09:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Antimony	<1.9	mg/Kg	1.9	8/22/2007 09:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Arsenic	<0.78	mg/Kg	0.78	8/22/2007 09:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Barium	21	mg/Kg	9.7	8/22/2007 09:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Beryllium	<0.39	mg/Kg	0.39	8/22/2007 09:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Cadmium	<0.39	mg/Kg	0.39	8/22/2007 09:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Calcium	400	mg/Kg	97	8/22/2007 09:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Chromium	4.1	mg/Kg	0.97	8/22/2007 09:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Cobalt	2.8	mg/Kg	0.97	8/22/2007 09:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Copper	9.1	mg/Kg	1.9	8/22/2007 09:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Iron	8400	mg/Kg	9.7	8/22/2007 09:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Lead	14	mg/Kg	0.97	8/22/2007 09:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Magnesium	930	mg/Kg	97	8/22/2007 09:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Manganese	190	mg/Kg	1.5	8/22/2007 09:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Nickel	7.1	mg/Kg	1.9	8/22/2007 09:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Potassium	700	mg/Kg	97	8/22/2007 09:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Selenium	<1.9	mg/Kg	1.9	8/22/2007 09:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Silver	1.0	mg/Kg	0.97	8/22/2007 09:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Sodium	<97	mg/Kg	97	8/22/2007 09:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Thallium	<0.97	mg/Kg	0.97	8/22/2007 09:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Vanadium	10.0	mg/Kg	0.97	8/22/2007 09:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Zinc	31	mg/Kg	1.9	8/22/2007 09:28 PM	rferrer
C-TAL Metals-Mercury, Total	7471A	Mercury	0.038	mg/Kg	0.021	8/21/2007 01:59 PM	dhemsley
SVOA	8270C TCL	See Attached			N/A	8/21/2007 03:20 PM	eayres



EMSL Analytical

3 Cooper St., Westmont, NJ 08108

Phone: (856) 858-4800 Fax: (856) 858-4571 Email: jsmith@emsl.com



Attn: **Robert Kreuzer**
Liro Group
690 Delaware Avenue
Buffalo, NY 14209

Fax: (716) 882-9640

Phone: (716) 882-5476

Customer ID: LIRO50
Customer PO:
Received: 08/20/07 8:56 AM
EMSL Order: 010703726

EMSL Proj: Bronx River Art Center

Report Date: 8/23/2007

<i>Client Sample Description</i>		SB-11, Grab		<i>Collected:</i>		8/17/2007		<i>Lab ID:</i>		0006	
<i>Test</i>	<i>Method</i>	<i>Parameter</i>	<i>Concentration</i>	<i>Units</i>	<i>RL</i>	<i>Analysis Date/Time</i>		<i>Analyst</i>			
C-Total Solids	2540B	Total Solids		92 %	0.50	8/21/2007 12:30 PM		tlech			
VOA	8260B	See Attached			N/A	8/20/2007 02:45 PM		wfink			

**EMSL Analytical**

3 Cooper St., Westmont, NJ 08108

Phone: (856) 858-4800 Fax: (856) 858-4571 Email: jsmith@emsl.com

EMSL

SM

Attn: **Robert Kreuzer**
Liro Group
690 Delaware Avenue
Buffalo, NY 14209

Fax: (716) 882-9640

Phone: (716) 882-5476

Customer ID: LIRO50

Customer PO:

Received: 08/20/07 8:56 AM

EMSL Order: 010703726

EMSL Proj: Bronx River Art Center

Report Date: 8/23/2007

Client Sample Description		SB-11, Comp	Collected: 8/17/2007		Lab ID: 0007		
Test	Method	Parameter	Concentration	Units	RL	Analysis Date/Time	Analyst
C-Total Solids	2540B	Total Solids	82	%	0.50	8/21/2007 12:30 PM	tlech
C-TAL Metals-C-Metals by ICP	6010B	Aluminum	6600	mg/Kg	9.8	8/22/2007 09:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Antimony	<2.0	mg/Kg	2.0	8/22/2007 09:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Arsenic	<0.79	mg/Kg	0.79	8/22/2007 09:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Barium	59	mg/Kg	9.8	8/22/2007 09:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Beryllium	<0.39	mg/Kg	0.39	8/22/2007 09:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Cadmium	0.61	mg/Kg	0.39	8/22/2007 09:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Calcium	2000	mg/Kg	98	8/22/2007 09:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Chromium	8.3	mg/Kg	0.98	8/22/2007 09:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Cobalt	5.2	mg/Kg	0.98	8/22/2007 09:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Copper	22	mg/Kg	2.0	8/22/2007 09:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Iron	13000	mg/Kg	9.8	8/22/2007 09:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Lead	200	mg/Kg	0.98	8/22/2007 09:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Magnesium-R	1900	mg/Kg	98	8/22/2007 09:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Manganese	230	mg/Kg	1.5	8/22/2007 09:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Nickel	11	mg/Kg	2.0	8/22/2007 09:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Potassium	820	mg/Kg	98	8/22/2007 09:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Selenium	<2.0	mg/Kg	2.0	8/22/2007 09:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Silver	2.4	mg/Kg	0.98	8/22/2007 09:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Sodium	<98	mg/Kg	98	8/22/2007 09:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Thallium	<0.98	mg/Kg	0.98	8/22/2007 09:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Vanadium	17	mg/Kg	0.98	8/22/2007 09:36 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Zinc	210	mg/Kg	2.0	8/22/2007 09:36 PM	rferrer
C-TAL Metals-Mercury, Total	7471A	Mercury	2.3	mg/Kg	0.022	8/21/2007 02:34 PM	dhemsley
SVOA	8270C TCL	See Attached			N/A	8/21/2007 03:50 PM	eayres

**EMSL Analytical**

3 Cooper St., Westmont, NJ 08108

Phone: (856) 858-4800 Fax: (856) 858-4571 Email: jsmith@emsl.com



Attn: **Robert Kreuzer**
Liro Group
690 Delaware Avenue
Buffalo, NY 14209

Customer ID: LIRO50
Customer PO:
Received: 08/20/07 8:56 AM
EMSL Order: 010703726
EMSL Proj: Bronx River Art Center
Report Date: 8/23/2007

Fax: (716) 882-9640 Phone: (716) 882-5476

Client Sample Description SB-12, Grab *Collected:* 8/17/2007 *Lab ID:* 0008

<i>Test</i>	<i>Method</i>	<i>Parameter</i>	<i>Concentration</i>	<i>Units</i>	<i>RL</i>	<i>Analysis Date/Time</i>	<i>Analyst</i>
C-Total Solids	2540B	Total Solids	87	%	0.50	8/21/2007 12:30 PM	tlech
VOA	8260B	See Attached			N/A	8/20/2007 03:30 PM	wfink

**EMSL Analytical**

3 Cooper St., Westmont, NJ 08108

Phone: (856) 858-4800 Fax: (856) 858-4571 Email: jsmith@emsl.com

EMSL

Attn: **Robert Kreuzer**
Liro Group
690 Delaware Avenue
Buffalo, NY 14209

Fax: (716) 882-9640

Phone: (716) 882-5476

Customer ID: LIRO50

Customer PO:

Received: 08/20/07 8:56 AM

EMSL Order: 010703726

EMSL Proj: Bronx River Art Center

Report Date: 8/23/2007

Client Sample Description SB-12, Comp

Collected: 8/17/2007

Lab ID: 0009

Test	Method	Parameter	Concentration	Units	RL	Analysis Date/Time	Analyst
C-Total Solids	2540B	Total Solids	91	%	0.50	8/21/2007 12:30 PM	tlech
C-TAL Metals-C-Metals by ICP	6010B	Aluminum	8900	mg/Kg	9.9	8/22/2007 10:00 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Antimony	<2.0	mg/Kg	2.0	8/22/2007 10:00 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Arsenic	<0.80	mg/Kg	0.80	8/22/2007 10:00 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Barium	85	mg/Kg	9.9	8/22/2007 10:00 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Beryllium	<0.40	mg/Kg	0.40	8/22/2007 10:00 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Cadmium	<0.40	mg/Kg	0.40	8/22/2007 10:00 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Calcium	1600	mg/Kg	99	8/22/2007 10:00 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Chromium	10	mg/Kg	0.99	8/22/2007 10:00 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Cobalt	5.8	mg/Kg	0.99	8/22/2007 10:00 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Copper	59	mg/Kg	2.0	8/22/2007 10:00 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Iron	19000	mg/Kg	9.9	8/22/2007 10:00 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Lead	170	mg/Kg	0.99	8/22/2007 10:00 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Magnesium-R	3100	mg/Kg	99	8/22/2007 10:00 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Manganese	250	mg/Kg	1.5	8/22/2007 10:00 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Nickel	12	mg/Kg	2.0	8/22/2007 10:00 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Potassium	1700	mg/Kg	99	8/22/2007 10:00 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Selenium	<2.0	mg/Kg	2.0	8/22/2007 10:00 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Silver	3.0	mg/Kg	0.99	8/22/2007 10:00 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Sodium	100	mg/Kg	99	8/22/2007 10:00 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Thallium	<0.99	mg/Kg	0.99	8/22/2007 10:00 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Vanadium	20	mg/Kg	0.99	8/22/2007 10:00 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Zinc	110	mg/Kg	2.0	8/22/2007 10:00 PM	rferrer
C-TAL Metals-Mercury, Total	7471A	Mercury	0.45	mg/Kg	0.021	8/21/2007 02:04 PM	dhemsley
SVOA	8270C TCL	See Attached			N/A	8/21/2007 04:20 PM	eayres

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name:		EMSL ANALYTICAL		Customer Sample#:	SB-9 / TWP-3, Grab
EMSL Sample ID:		010703726-0001	Project:	Bronx River Art Center	
Lab File ID:		V11679.D	Sample Matrix:	Soils	
Instrument ID:		VOA MSD-V	Sampling Date:	8/17/2007	
Analyst:		WRF	Analysis Date	8/20/2007 13:16:00	
GC Column:		RTX-502.2 (0.25 mm)	Level (low/med):	LOW	
Sample wt/vol:		5 G	Nominal Amount:	5 G	
Dilution Factor:		1	Method:	SW846 8260B	
Sample Container:		Jar (SW-846 5035)	Moisture(%)	12	
Heated Purge (Y/N):		Y			

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
75-71-8	Dichlorodifluoromethane	1.1		U
74-87-3	Chloromethane	1.1		U
75-01-4	Vinyl chloride	1.1		U
74-83-9	Bromomethane	1.1		U
75-00-3	Chloroethane	1.1		U
75-69-4	Trichlorofluoromethane	1.1		U
107-02-8	Acrolein	57		U
76-13-1	Freon 113(1,1,2-Trichlorotrifluoroethan	1.1		U
75-35-4	1,1-Dichloroethene	1.1		U
67-64-1	Acetone	11	2.3	JB
75-15-0	Carbon disulfide	1.1		U
75-09-2	Methylene chloride	1.1	7.6	
75-65-0	tert-Butyl Alcohol	11		U
156-60-5	trans-1,2-Dichloroethene	1.1		U
1634-04-4	Methyl-tert butyl ether	1.1		U
107-13-1	Acrylonitrile	1.1		U
75-34-3	1,1-Dichloroethane	1.1		U
594-20-7	2,2-Dichloropropane	1.1		U
156-59-2	cis-1,2-Dichloroethene	1.1		U
78-93-3	2-Butanone	2.3		U
74-97-1	Bromochloromethane	1.1		U
67-66-3	Chloroform	1.1		U
71-55-6	1,1,1-Trichloroethane	1.1		U
56-23-1	Carbon tetrachloride	1.1		U
563-58-6	1,1-Dichloropropene	1.1		U
71-43-2	Benzene	0.57		U
107-06-2	1,2-Dichloroethane	1.1		U
79-01-6	Trichloroethene	1.1		U
78-87-1	1,2-Dichloropropane	1.1		U
74-95-3	Dibromomethane	1.1		U
75-27-4	Bromodichloromethane	1.1		U

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: EMSL ANALYTICAL		Customer Sample#:	SB-9 / TWP-3, Grab
EMSL Sample ID:	010703726-0001	Project:	Bronx River Art Center
Lab File ID:	V11679.D	Sample Matrix:	Soils
Instrument ID:	VOA MSD-V	Sampling Date:	8/17/2007
Analyst:	WRF	Analysis Date:	8/20/2007 13:16:00
GC Column:	RTX-502.2 (0.25 mm)	Level (low/med):	LOW
Sample wt/vol:	5 G	Nominal Amount:	5 G
Dilution Factor:	1	Method:	SW846 8260B
Sample Container:	Jar (SW-846 5035)	Moisture(%)	12
Heated Purge (Y/N):	Y		

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
110-75-8	2-Chloroethyl vinyl ether	23		U
10061-01-5	cis-1,3-Dichloropropene	1.1		U
108-10-1	4-Methyl-2-pentanone	11		U
108-88-3	Toluene	1.1		U
10061-02-6	trans-1,3-Dichloropropene	1.1		U
79-00-1	1,1,2-Trichloroethane	1.1		U
127-18-4	Tetrachloroethene	1.1		U
142-28-9	1,3-Dichloropropane	1.1		U
591-78-6	2-Hexanone	11		U
124-48-1	Dibromochloromethane	1.1		U
106-93-4	1,2-Dibromoethane	1.1		U
108-90-7	Chlorobenzene	1.1		U
630-20-6	1,1,1,2-Tetrachloroethane	1.1		U
100-41-4	Ethylbenzene	1.1		U
108-38-3	Xylene (para & meta)	1.1		U
95-47-6	Xylene (Ortho)	1.1		U
100-42-1	Styrene	1.1		U
75-25-2	Bromoform	1.1		U
98-82-8	Isopropylbenzene	1.1	28	
108-86-1	Bromobenzene	1.1		U
79-34-1	1,1,2,2-Tetrachloroethane	1.1		U
96-18-4	1,2,3-Trichloropropane	1.1		U
103-65-1	n-Propylbenzene	1.1	31	
110-57-6	trans-1,4-Dichloro-2-butene	2.3		U
95-49-8	2-Chlorotoluene	1.1		U
106-43-4	4-Chlorotoluene	1.1		U
108-67-8	1,3,5-Trimethylbenzene	1.1		U
98-06-6	tert-Butylbenzene	1.1	43	
95-63-6	1,2,4-Trimethylbenzene	1.1		U
135-98-8	sec-Butylbenzene	1.1	120	E
541-73-1	1,3-Dichlorobenzene	1.1		U

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SB-9 / TWP-3, Grab		
Lab Name:	EMSL ANALYTICAL	Project:	Bronx River Art Center	
EMSL Sample ID:	010703726-0001	Sample Matrix:	Soils	
Lab File ID:	V11679.D	Sampling Date:	8/17/2007	
Instrument ID:	VOA MSD-V	Analysis Date:	8/20/2007 13:16:00	
Analyst:	WRF	Level (low/med):	LOW	
GC Column:	RTX-502.2 (0.25 mm)	Nominal Amount:	5 G	
Sample wt/vol:	5 G	Method:	SW846 8260B	
Dilution Factor:	1	Moisture(%)	12	
Sample Container:	Jar (SW-846 5035)			
Heated Purge (Y/N):	Y			

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
99-87-6	4-Isopropyltoluene	1.1		U
106-46-7	1,4-Dichlorobenzene	1.1		U
95-50-1	1,2-Dichlorobenzene	1.1		U
104-51-8	n-Butylbenzene	1.1	34	
96-12-8	1,2-Dibromo-3-chloropropane	1.1		U
120-82-1	1,2,4-Trichlorobenzene	1.1		U
87-68-3	Hexachlorobutadiene	1.1		U
91-20-3	Naphthalene	1.1	1.4	
87-61-6	1,2,3-Trichlorobenzene	1.1		U

Qualifier Definitions
 U = Undetected
 B = Compound detected in method blank
 E = Estimated value
 J = Estimated concentration.
 D = Dilution

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: EMSL Analytical Inc.		Customer Sample#: SB-9 / TWP-3, Comp
EMSL Sample ID: 010703726-0002	Project: Bronx River Art Center	
Lab File ID: A08003.D	Sample Matrix: Soils	
Instrument ID: SVOA MSD-A	Sampling Date: 8/17/07	
Analyst: EAA	Date Extracted: 8/21/07	
GC Column: RXI-5MS (0.25 mm)	Analysis Date: 8/21/07 02:50:00 PM	
Level (low/med): LOW	Sample wt/vol: 30.08 G	
% Moisture: 13	Dilution Factor: 1	
PH:	Conc. Extract Volume: 1000 (uL)	
GPC Cleanup(Y/N): N	Injection Volume: 1 (ul)	
Method: SW846 8270BNA	Extraction Type: 3550B	

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
62-75-9	N-nitrosodimethylamine	190		U
108-95-2	Phenol	38		U
100-51-6	Benzyl alcohol	190		U
111-44-4	bis(2-Chloroethyl)ether	190		U
95-57-8	2-Chlorophenol	190		U
541-73-1	1,3-Dichlorobenzene	190		U
106-46-7	1,4-Dichlorobenzene	190		U
95-50-1	1,2-Dichlorobenzene	190		U
95-48-7	2-Methylphenol	38		U
108-60-1	bis(2-chloroisopropyl)ether	190		U
1319-77-3	3+4-Methylphenol	190		U
621-64-7	N-Nitroso-Di-n-propylamine	190		U
67-72-1	Hexachloroethane	190		U
65-85-0	Benzoic Acid	380		U
98-95-3	Nitrobenzene	190		U
78-59-1	Isophorone	190		U
88-75-5	2-Nitrophenol	190		U
105-67-9	2,4-Dimethylphenol	190		U
111-91-1	bis(2-Chloroethoxy)methane	190		U
120-83-2	2,4-Dichlorophenol	190		U
120-82-1	1,2,4-Trichlorobenzene	190		U
91-20-3	Naphthalene	19		U
106-47-8	4-Chloroaniline	190		U
87-68-3	Hexachlorobutadiene	190		U
59-50-7	4-Chloro-3-methylphenol	190		U
91-58-7	2-Chloronaphthalene	190		U
91-57-6	2-Methylnaphthalene	19		U
77-47-4	Hexachlorocyclopentadiene	190		U
88-06-2	2,4,6-Trichlorophenol	190		U
95-95-4	2,4,5-Trichlorophenol	38		U

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SB-9 / TWP-3, Comp		
Lab Name:	EMSL Analytical Inc.	Project:	Bronx River Art Center	
EMSL Sample ID:	010703726-0002	Sample Matrix:	Soils	
Lab File ID:	A08003.D	Sampling Date:	8/17/07	
Instrument ID:	SVOA MSD-A	Date Extracted:	8/21/07	
Analyst:	EAA	Analysis Date	8/21/07 02:50:00 PM	
GC Column:	RXI-5MS (0.25 mm)	Sample wt/vol:	30.08 G	
Level (low/med):	LOW	Dilution Factor:	1	
% Moisture:	13	Conc. Extract Volume:	1000 (uL)	
PH:		Injection Volume:	1 (ul)	
GPC Cleanup(Y/N):	N	Extraction Type:	3550B	
Method:	SW846 8270BNA			

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
88-74-4	2-Nitroaniline	190		U
131-11-3	Dimethylphthalate	190		U
208-96-8	Acenaphthylene	19	150	
606-20-2	2,6-Dinitrotoluene	190		U
99-09-2	3-Nitroaniline	190		U
83-32-9	Acenaphthene	19	13	J
51-28-5	2,4-Dinitrophenol	190		U
100-02-7	4-Nitrophenol	38		U
132-64-9	Dibenzofuran	190		U
121-14-2	2,4-Dinitrotoluene	190		U
84-66-2	Diethylphthalate	190		U
86-73-7	Fluorene	19	15	J
7005-72-3	4-Chlorophenyl-phenylether	190		U
100-01-6	4-Nitroaniline	190		U
534-52-1	4,6-Dinitro-2-methylphenol	190		U
86-30-6	n-Nitrosodiphenylamine	190		U
122-66-7	1,2-Diphenylhydrazine (as azobenzene)	190		U
101-55-3	4-Bromophenyl-phenylether	190		U
118-74-1	Hexachlorobenzene	190		U
87-86-5	Pentachlorophenol	190		U
85-01-08	Phenanthrene	19	290	
120-12-7	Anthracene	19	120	
86-74-8	Carbazole	190	31	J
84-74-2	Di-n-butylphthalate	190	56	JB
206-44-0	Fluoranthene	19	1300	
92-87-5	Benzidine	190		U
129-00-0	Pyrene	19	1100	
85-68-7	Butylbenzylphthalate	190		U
56-55-3	Benzo[a]anthracene	19	630	
91-94-1	3,3'-Dichlorobenzidine	190		U

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#: SB-9 / TWP-3, Comp	
Lab Name: EMSL Analytical Inc.	
EMSL Sample ID: 010703726-0002	Project: Bronx River Art Center
Lab File ID: A08003.D	Sample Matrix: Soils
Instrument ID: SVOA MSD-A	Sampling Date: 8/17/07
Analyst: EAA	Date Extracted: 8/21/07
GC Column: RXI-5MS (0.25 mm)	Analysis Date: 8/21/07 02:50:00 PM
Level (low/med): LOW	Sample wt/vol: 30.08 G
% Moisture: 13	Dilution Factor: 1
PH:	Conc. Extract Volume: 1000 (uL)
GPC Cleanup(Y/N): N	Injection Volume: 1 (ul)
Method: SW846 8270BNA	Extraction Type: 3550B

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
218-01-9	Chrysene	19	540	
117-81-7	bis(2-Ethylhexyl)phthalate	190	24	J
117-84-0	Di-n-octylphthalate	190		U
205-99-2	Benzo[b]fluoranthene	19	460	
207-08-9	Benzo[k]fluoranthene	19	540	
50-32-8	Benzo[a]pyrene	19	630	
193-39-5	Indeno[1,2,3-cd]pyrene	19	400	
53-70-3	Dibenz[a,h]anthracene	12		U
191-24-2	Benzo[g,h,i]perylene	19	450	

Qualifier Definitions
 U = Undetected
 B = Compound detected in method blank
 E = Estimated value
 J = Estimated concentration.
 D = Dilution

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:

SB-9 / TWP-3

Lab Name: EMSL ANALYTICAL

EMSL Sample ID: 010703726-0003

Project:

Bronx River Art Center

Lab File ID: T0928.D

Sample Matrix:

Waste Water

Instrument ID: VOA MSD-T

Sampling Date:

8/17/2007

Analyst: AF

Analysis Date

8/21/2007 16:25:00

GC Column: RTX-502.2 (0.25 mm)

Level (low/med):

LOW

Sample wt/vol: 5 ML

Nominal Amount:

5 ML

Dilution Factor: 1

Method:

SW846 8260B

Heated Purge (Y/N): N

CAS NO	COMPOUND	Report Limit (µg/L)	CONC. (µg/L)	Q
75-71-8	Dichlorodifluoromethane	1.0		U
74-87-3	Chloromethane	1.0		U
75-01-4	Vinyl chloride	1.0		U
74-83-9	Bromomethane	5.0		U
75-00-3	Chloroethane	1.0		U
75-69-4	Trichlorofluoromethane	1.0		U
107-02-8	Acrolein	25		U
76-13-1	Freon 113(1,1,2-Trichlorotrifluoroethan	1.0		U
75-35-4	1,1-Dichloroethene	1.0		U
67-64-1	Acetone	10	2.6	J
75-15-0	Carbon disulfide	1.0		U
75-09-2	Methylene chloride	1.0	2.3	B
75-65-0	tert-Butyl Alcohol	10		U
156-60-5	trans-1,2-Dichloroethene	1.0		U
1634-04-4	Methyl-tert butyl ether	1.0		U
107-13-1	Acrylonitrile	1.0		U
75-34-3	1,1-Dichloroethane	1.0		U
594-20-7	2,2-Dichloropropane	1.0		U
156-59-2	cis-1,2-Dichloroethene	1.0	1.5	
78-93-3	2-Butanone	2.0		U
74-97-1	Bromochloromethane	1.0		U
67-66-3	Chloroform	1.0		U
71-55-6	1,1,1-Trichloroethane	1.0		U
56-23-1	Carbon tetrachloride	1.0		U
563-58-6	1,1-Dichloropropene	1.0		U
71-43-2	Benzene	0.50		U
107-06-2	1,2-Dichloroethane	1.0		U
79-01-6	Trichloroethene	1.0		U
78-87-1	1,2-Dichloropropane	1.0		U
74-95-3	Dibromomethane	1.0		U
75-27-4	Bromodichloromethane	1.0		U
110-75-8	2-Chloroethyl vinyl ether	20		U
10061-01-5	cis-1,3-Dichloropropene	1.0		U

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#: SB-9 / TWP-3	
Lab Name: EMSL ANALYTICAL	Project: Bronx River Art Center
EMSL Sample ID: 010703726-0003	Sample Matrix: Waste Water
Lab File ID: T0928.D	Sampling Date: 8/17/2007
Instrument ID: VOA MSD-T	Analysis Date: 8/21/2007 16:25:00
Analyst: AF	Level (low/med): LOW
GC Column: RTX-502.2 (0.25 mm)	Nominal Amount: 5 ML
Sample wt/vol: 5 ML	Method: SW846 8260B
Dilution Factor: 1	
Heated Purge (Y/N): N	

CAS NO	COMPOUND	Report Limit (µg/L)	CONC. (µg/L)	Q
108-10-1	4-Methyl-2-pentanone	10		U
108-88-3	Toluene	1.0		U
10061-02-6	trans-1,3-Dichloropropene	1.0		U
79-00-1	1,1,2-Trichloroethane	1.0		U
127-18-4	Tetrachloroethene	1.0		U
142-28-9	1,3-Dichloropropane	1.0		U
591-78-6	2-Hexanone	10		U
124-48-1	Dibromochloromethane	1.0		U
106-93-4	1,2-Dibromoethane	1.0		U
108-90-7	Chlorobenzene	1.0		U
630-20-6	1,1,1,2-Tetrachloroethane	1.0		U
100-41-4	Ethylbenzene	1.0		U
108-38-3	Xylene (para & meta)	1.0		U
95-47-6	Xylene (Ortho)	1.0		U
100-42-1	Styrene	1.0		U
75-25-2	Bromoform	1.0	9.5	
98-82-8	Isopropylbenzene	1.0		U
108-86-1	Bromobenzene	1.0		U
79-34-1	1,1,2,2-Tetrachloroethane	1.0		U
96-18-4	1,2,3-Trichloropropane	1.0	7.6	
103-65-1	n-Propylbenzene	2.0		U
110-57-6	trans-1,4-Dichloro-2-butene	1.0		U
95-49-8	2-Chlorotoluene	1.0		U
106-43-4	4-Chlorotoluene	1.0		U
108-67-8	1,3,5-Trimethylbenzene	1.0		U
98-06-6	tert-Butylbenzene	1.0	9.1	
95-63-6	1,2,4-Trimethylbenzene	1.0		U
135-98-8	sec-Butylbenzene	1.0	18	
541-73-1	1,3-Dichlorobenzene	1.0		U
99-87-6	4-Isopropyltoluene	1.0	15	
106-46-7	1,4-Dichlorobenzene	1.0		U
95-50-1	1,2-Dichlorobenzene	1.0		U
104-51-8	n-Butylbenzene	1.0		U

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SB-9 / TWP-3		
Lab Name:	EMSL ANALYTICAL	Project:	Bronx River Art Center	
EMSL Sample ID:	010703726-0003	Sample Matrix:	Waste Water	
Lab File ID:	T0928.D	Sampling Date:	8/17/2007	
Instrument ID:	VOA MSD-T	Analysis Date:	8/21/2007 16:25:00	
Analyst:	AF	Level (low/med):	LOW	
GC Column:	RTX-502.2 (0.25 mm)	Nominal Amount:	5 ML	
Sample wt/vol:	5 ML	Method:	SW846 8260B	
Dilution Factor:	1			
Heated Purge (Y/N):	N			

CAS NO	COMPOUND	Report Limit (µg/L)	CONC. (µg/L)	Q
96-12-8	1,2-Dibromo-3-chloropropane	1.0		U
120-82-1	1,2,4-Trichlorobenzene	1.0		U
87-68-3	Hexachlorobutadiene	1.0		U
91-20-3	Naphthalene	1.0		U
87-61-6	1,2,3-Trichlorobenzene	1.0		U

Qualifier Definitions
 U = Undetected
 B = Compound detected in method blank
 E = Estimated value
 J = Estimated concentration.
 D = Dilution

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#: SB-9 / TWP-3	
Lab Name: EMSL Analytical Inc.	
EMSL Sample ID: 010703726-0003	Project: Bronx River Art Center
Lab File ID: A08017.D	Sample Matrix: Waste Water
Instrument ID: SVOA MSD-A	Sampling Date: 8/17/07
Analyst: EAA	Date Extracted: 8/22/07
GC Column: RXI-5MS (0.25 mm)	Analysis Date: 8/22/07 01:15:00 PM
Level (low/med): LOW	Sample wt/vol: 790 ML
% Moisture:	Dilution Factor: 1
PH:	Conc. Extract Volume: 1000 (uL)
GPC Cleanup(Y/N): N	Injection Volume: 1 (ul)
Method: EPA 625 BNA	Extraction Type: 3520C

CAS NO	COMPOUND	Report Limit (µg/L)	CONC. (µg/L)	Q
62-75-9	N-nitrosodimethylamine	0.25		U
108-95-2	Phenol	1.8		U
111-44-4	bis(2-Chloroethyl)ether	1.3		U
95-57-8	2-Chlorophenol	0.94		U
541-73-1	1,3-Dichlorobenzene	0.44		U
106-46-7	1,4-Dichlorobenzene	0.44		U
95-50-1	1,2-Dichlorobenzene	0.37		U
108-60-1	bis(2-chloroisopropyl)ether	0.58		U
621-64-7	N-Nitroso-Di-n-propylamine	0.57		U
67-72-1	Hexachloroethane	0.41		U
98-95-3	Nitrobenzene	0.63		U
78-59-1	Isophorone	0.34		U
88-75-5	2-Nitrophenol	2.5		U
105-67-9	2,4-Dimethylphenol	1.8		U
111-91-1	bis(2-Chloroethoxy)methane	0.46		U
120-83-2	2,4-Dichlorophenol	2.8		U
120-82-1	1,2,4-Trichlorobenzene	0.58		U
91-20-3	Naphthalene	0.28		U
87-68-3	Hexachlorobutadiene	0.54		U
59-50-7	4-Chloro-3-methylphenol	1.6		U
91-58-7	2-Chloronaphthalene	0.49		U
77-47-4	Hexachlorocyclopentadiene	1.7		U
88-06-2	2,4,6-Trichlorophenol	3.5		U
131-11-3	Dimethylphthalate	0.39		U
208-96-8	Acenaphthylene	0.25	0.48	
606-20-2	2,6-Dinitrotoluene	0.37		U
83-32-9	Acenaphthene	0.32		U
51-28-5	2,4-Dinitrophenol	1.9		U
100-02-7	4-Nitrophenol	3.9		U
121-14-2	2,4-Dinitrotoluene	0.56		U

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#: SB-9 / TWP-3	
Lab Name: EMSL Analytical Inc.	Project: Bronx River Art Center
EMSL Sample ID: 010703726-0003	Sample Matrix: Waste Water
Lab File ID: A08017.D	Sampling Date: 8/17/07
Instrument ID: SVOA MSD-A	Date Extracted: 8/22/07
Analyst: EAA	Analysis Date: 8/22/07 01:15:00 PM
GC Column: RXI-5MS (0.25 mm)	Sample wt/vol: 790 ML
Level (low/med): LOW	Dilution Factor: 1
% Moisture:	Conc. Extract Volume: 1000 (uL)
PH:	Injection Volume: 1 (ul)
GPC Cleanup(Y/N): N	Extraction Type: 3520C
Method: EPA 625 BNA	

CAS NO	COMPOUND	Report Limit (µg/L)	CONC. (µg/L)	Q
84-66-2	Diethylphthalate	0.49		U
86-73-7	Fluorene	0.38		U
7005-72-3	4-Chlorophenyl-phenylether	0.42		U
534-52-1	4,6-Dinitro-2-methylphenol	2.6		U
86-30-6	n-Nitrosodiphenylamine	0.38		U
122-66-7	1,2-Diphenylhydrazine(as azo)	6.3		U
101-55-3	4-Bromophenyl-phenylether	0.52		U
118-74-1	Hexachlorobenzene	0.63		U
87-86-5	Pentachlorophenol	3.3		U
85-01-08	Phenanthrene	0.34	1.4	
120-12-7	Anthracene	0.47		U
84-74-2	Di-n-butylphthalate	2.0		U
206-44-0	Fluoranthene	0.28	4.8	
92-87-5	Benzidine	0.85		U
129-00-0	Pyrene	0.25	4.3	
85-68-7	Butylbenzylphthalate	0.30		U
56-55-3	Benzo[a]anthracene	0.33	1.7	
91-94-1	3,3'-Dichlorobenzidine	1.6		U
218-01-9	Chrysene	0.25	1.4	
117-81-7	bis(2-Ethylhexyl)phthalate	0.70		U
117-84-0	Di-n-octylphthalate	0.32		U
205-99-2	Benzo[b]fluoranthene	0.27	2.3	
207-08-9	Benzo[k]fluoranthene	0.35	1.2	
50-32-8	Benzo[a]pyrene	0.30	2.3	
193-39-5	Indeno[1,2,3-cd]pyrene	0.29		U
53-70-3	Dibenz[a,h]anthracene	0.41		U
191-24-2	Benzo[g,h,i]perylene	0.27	0.92	

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SB-9 / TWP-3		
Lab Name:	EMSL Analytical Inc.	Project:	Bronx River Art Center	
EMSL Sample ID:	010703726-0003	Sample Matrix:	Waste Water	
Lab File ID:	A08017.D	Sampling Date:	8/17/07	
Instrument ID:	SVOA MSD-A	Date Extracted:	8/22/07	
Analyst:	EAA	Analysis Date	8/22/07 01:15:00 PM	
GC Column:	RXI-5MS (0.25 mm)	Sample wt/vol:	790 ML	
Level (low/med):	LOW	Dilution Factor:	1	
% Moisture:		Conc. Extract Volume:	1000 (uL)	
PH:		Injection Volume:	1 (ul)	
GPC Cleanup(Y/N):	N	Extraction Type:	3520C	
Method:	EPA 625 BNA			

CAS NO	COMPOUND	Report Limit (µg/L)	CONC. (µg/L)	Q
Qualifier Definitions U = Undetected B = Compound detected in method blank E = Estimated value J = Estimated concentration. D = Dilution				

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SB-10, Grab	
Lab Name:	EMSL ANALYTICAL	Project:	Bronx River Art Center
EMSL Sample ID:	010703726-0004	Sample Matrix:	Soils
Lab File ID:	V11680.D	Sampling Date:	8/17/2007
Instrument ID:	VOA MSD-V	Analysis Date:	8/20/2007 14:00:00
Analyst:	WRF	Level (low/med):	LOW
GC Column:	RTX-502.2 (0.25 mm)	Nominal Amount:	5 G
Sample wt/vol:	5 G	Method:	SW846 8260B
Dilution Factor:	1	Molsture(%)	13
Sample Container:	Jar (SW-846 5035)		
Heated Purge (Y/N):	Y		

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
75-71-8	Dichlorodifluoromethane	1.1		U
74-87-3	Chloromethane	1.1		U
75-01-4	Vinyl chloride	1.1		U
74-83-9	Bromomethane	1.1		U
75-00-3	Chloroethane	1.1		U
75-69-4	Trichlorofluoromethane	1.1		U
107-02-8	Acrolein	57		U
76-13-1	Freon 113(1,1,2-Trichlorotrifluoroethane)	1.1		U
75-35-4	1,1-Dichloroethene	1.1		U
67-64-1	Acetone	11	4.4	JB
75-15-0	Carbon disulfide	1.1		U
75-09-2	Methylene chloride	1.1	5.7	
75-65-0	tert-Butyl Alcohol	11		U
156-60-5	trans-1,2-Dichloroethene	1.1		U
1634-04-4	Methyl-tert butyl ether	1.1		U
107-13-1	Acrylonitrile	1.1		U
75-34-3	1,1-Dichloroethane	1.1		U
594-20-7	2,2-Dichloropropane	1.1		U
156-59-2	cis-1,2-Dichloroethene	1.1		U
78-93-3	2-Butanone	2.3		U
74-97-1	Bromochloromethane	1.1		U
67-66-3	Chloroform	1.1		U
71-55-6	1,1,1-Trichloroethane	1.1		U
56-23-1	Carbon tetrachloride	1.1		U
563-58-6	1,1-Dichloropropene	1.1		U
71-43-2	Benzene	0.57		U
107-06-2	1,2-Dichloroethane	1.1		U
79-01-6	Trichloroethene	1.1		U
78-87-1	1,2-Dichloropropane	1.1		U
74-95-3	Dibromomethane	1.1		U
75-27-4	Bromodichloromethane	1.1		U

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: EMSL ANALYTICAL		Customer Sample#: SB-10, Grab
EMSL Sample ID: 010703726-0004	Project: Bronx River Art Center	
Lab File ID: V11680.D	Sample Matrix: Soils	
Instrument ID: VOA MSD-V	Sampling Date: 8/17/2007	
Analyst: WRF	Analysis Date: 8/20/2007 14:00:00	
GC Column: RTX-502.2 (0.25 mm)	Level (low/med): LOW	
Sample wt/vol: 5 G	Nominal Amount: 5 G	
Dilution Factor: 1	Method: SW846 8260B	
Sample Container: Jar (SW-846 5035)	Moisture(%): 13	
Heated Purge (Y/N): Y		

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
110-75-8	2-Chloroethyl vinyl ether	23		U
10061-01-5	cis-1,3-Dichloropropene	1.1		U
108-10-1	4-Methyl-2-pentanone	11		U
108-88-3	Toluene	1.1		U
10061-02-6	trans-1,3-Dichloropropene	1.1		U
79-00-1	1,1,2-Trichloroethane	1.1		U
127-18-4	Tetrachloroethene	1.1		U
142-28-9	1,3-Dichloropropane	1.1		U
591-78-6	2-Hexanone	11		U
124-48-1	Dibromochloromethane	1.1		U
106-93-4	1,2-Dibromoethane	1.1		U
108-90-7	Chlorobenzene	1.1		U
630-20-6	1,1,1,2-Tetrachloroethane	1.1		U
100-41-4	Ethylbenzene	1.1		U
108-38-3	Xylene (para & meta)	1.1		U
95-47-6	Xylene (Ortho)	1.1		U
100-42-1	Styrene	1.1		U
75-25-2	Bromoform	1.1		U
98-82-8	Isopropylbenzene	1.1		U
108-86-1	Bromobenzene	1.1		U
79-34-1	1,1,2,2-Tetrachloroethane	1.1		U
96-18-4	1,2,3-Trichloropropane	1.1		U
103-65-1	n-Propylbenzene	1.1		U
110-57-6	trans-1,4-Dichloro-2-butene	2.3		U
95-49-8	2-Chlorotoluene	1.1		U
106-43-4	4-Chlorotoluene	1.1		U
108-67-8	1,3,5-Trimethylbenzene	1.1		U
98-06-6	tert-Butylbenzene	1.1		U
95-63-6	1,2,4-Trimethylbenzene	1.1		U
135-98-8	sec-Butylbenzene	1.1		U
541-73-1	1,3-Dichlorobenzene	1.1		U

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SB-10, Grab		
Lab Name:	EMSL ANALYTICAL			
EMSL Sample ID:	010703726-0004	Project:	Bronx River Art Center	
Lab File ID:	V11680.D	Sample Matrix:	Soils	
Instrument ID:	VOA MSD-V	Sampling Date:	8/17/2007	
Analyst:	WRF	Analysis Date	8/20/2007 14:00:00	
GC Column:	RTX-502.2 (0.25 mm)	Level (low/med):	LOW	
Sample wt/vol:	5 G	Nominal Amount:	5 G	
Dilution Factor:	1	Method:	SW846 8260B	
Sample Container:	Jar (SW-846 5035)	Moisture(%)	13	
Heated Purge (Y/N):	Y			

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
99-87-6	4-Isopropyltoluene	1.1		U
106-46-7	1,4-Dichlorobenzene	1.1		U
95-50-1	1,2-Dichlorobenzene	1.1		U
104-51-8	n-Butylbenzene	1.1		U
96-12-8	1,2-Dibromo-3-chloropropane	1.1		U
120-82-1	1,2,4-Trichlorobenzene	1.1		U
87-68-3	Hexachlorobutadiene	1.1		U
91-20-3	Naphthalene	1.1		U
87-61-6	1,2,3-Trichlorobenzene	1.1		U

Qualifier Definitions
 U = Undetected
 B = Compound detected in method blank
 E = Estimated value
 J = Estimated concentration.
 D = Dilution

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SB-10, Comp	
Lab Name:	EMSL Analytical Inc.	Project:	Bronx River Art Center
EMSL Sample ID:	010703726-0005	Sample Matrix:	Soils
Lab File ID:	A08004.D	Sampling Date:	8/17/07
Instrument ID:	SVOA MSD-A	Date Extracted:	8/21/07
Analyst:	EAA	Analysis Date	8/21/07 03:20:00 PM
GC Column:	RXI-5MS (0.25 mm)	Sample wt/vol:	30 G
Level (low/med):	LOW	Dilution Factor:	1
% Moisture:	14	Conc. Extract Volume:	1000 (uL)
PH:		Injection Volume:	1 (uL)
GPC Cleanup(Y/N):	N	Extraction Type:	3550B
Method:	SW846 8270BNA		

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
62-75-9	N-nitrosodimethylamine	190		U
108-95-2	Phenol	39		U
100-51-6	Benzyl alcohol	190		U
111-44-4	bis(2-Chloroethyl)ether	190		U
95-57-8	2-Chlorophenol	190		U
541-73-1	1,3-Dichlorobenzene	190		U
106-46-7	1,4-Dichlorobenzene	190		U
95-50-1	1,2-Dichlorobenzene	190		U
95-48-7	2-Methylphenol	39		U
108-60-1	bis(2-chloroisopropyl)ether	190		U
1319-77-3	3+4-Methylphenol	190		U
621-64-7	N-Nitroso-Di-n-propylamine	190		U
67-72-1	Hexachloroethane	190		U
65-85-0	Benzoic Acid	390		U
98-95-3	Nitrobenzene	190		U
78-59-1	Isophorone	190		U
88-75-5	2-Nitrophenol	190		U
105-67-9	2,4-Dimethylphenol	190		U
111-91-1	bis(2-Chloroethoxy)methane	190		U
120-83-2	2,4-Dichlorophenol	190		U
120-82-1	1,2,4-Trichlorobenzene	190		U
91-20-3	Naphthalene	19		U
106-47-8	4-Chloroaniline	190		U
87-68-3	Hexachlorobutadiene	190		U
59-50-7	4-Chloro-3-methylphenol	190		U
91-58-7	2-Chloronaphthalene	190		U
91-57-6	2-Methylnaphthalene	19		U
77-47-4	Hexachlorocyclopentadiene	190		U
88-06-2	2,4,6-Trichlorophenol	190		U
95-95-4	2,4,5-Trichlorophenol	39		U

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#: SB-10, Comp	
Lab Name: EMSL Analytical Inc.	Project: Bronx River Art Center
EMSL Sample ID: 010703726-0005	Sample Matrix: Soils
Lab File ID: A08004.D	Sampling Date: 8/17/07
Instrument ID: SVOA MSD-A	Date Extracted: 8/21/07
Analyst: EAA	Analysis Date: 8/21/07 03:20:00 PM
GC Column: RXI-5MS (0.25 mm)	Sample wt/vol: 30 G
Level (low/med): LOW	Dilution Factor: 1
% Moisture: 14	Conc. Extract Volume: 1000 (uL)
PH:	Injection Volume: 1 (ul)
GPC Cleanup(Y/N): N	Extraction Type: 3550B
Method: SW846 8270BNA	

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
88-74-4	2-Nitroaniline	190		U
131-11-3	Dimethylphthalate	190		U
208-96-8	Acenaphthylene	19	23	
606-20-2	2,6-Dinitrotoluene	190		U
99-09-2	3-Nitroaniline	190		U
83-32-9	Acenaphthene	19		U
51-28-5	2,4-Dinitrophenol	190		U
100-02-7	4-Nitrophenol	39		U
132-64-9	Dibenzofuran	190		U
121-14-2	2,4-Dinitrotoluene	190		U
84-66-2	Diethylphthalate	190		U
86-73-7	Fluorene	19		U
7005-72-3	4-Chlorophenyl-phenylether	190		U
100-01-6	4-Nitroaniline	190		U
534-52-1	4,6-Dinitro-2-methylphenol	190		U
86-30-6	n-Nitrosodiphenylamine	190		U
122-66-7	1,2-Diphenylhydrazine (as azobenzene)	190		U
101-55-3	4-Bromophenyl-phenylether	190		U
118-74-1	Hexachlorobenzene	190		U
87-86-5	Pentachlorophenol	190		U
85-01-08	Phenanthrene	19	110	
120-12-7	Anthracene	19	33	
86-74-8	Carbazole	190		U
84-74-2	Di-n-butylphthalate	190	60	JB
206-44-0	Fluoranthene	19	310	
92-87-5	Benzidine	190		U
129-00-0	Pyrene	19	300	
85-68-7	Butylbenzylphthalate	190		U
56-55-3	Benzo[a]anthracene	19	190	
91-94-1	3,3'-Dichlorobenzidine	190		U

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: EMSL Analytical Inc.		Customer Sample#: SB-10, Comp
EMSL Sample ID: 010703726-0005	Project: Bronx River Art Center	
Lab File ID: A08004.D	Sample Matrix: Soils	
Instrument ID: SVOA MSD-A	Sampling Date: 8/17/07	
Analyst: EAA	Date Extracted: 8/21/07	
GC Column: RXI-5MS (0.25 mm)	Analysis Date: 8/21/07 03:20:00 PM	
Level (low/med): LOW	Sample wt/vol: 30 G	
% Moisture: 14	Dilution Factor: 1	
PH:	Conc. Extract Volume: 1000 (uL)	
GPC Cleanup(Y/N): N	Injection Volume: 1 (ul)	
Method: SW846 8270BNA	Extraction Type: 3550B	

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
218-01-9	Chrysene	19	190	
117-81-7	bis(2-Ethylhexyl)phthalate	190	37	J
117-84-0	Di-n-octylphthalate	190		U
205-99-2	Benzo[b]fluoranthene	19	170	
207-08-9	Benzo[k]fluoranthene	19	160	
50-32-8	Benzo[a]pyrene	19	210	
193-39-5	Indeno[1,2,3-cd]pyrene	19	130	
53-70-3	Dibenz[a,h]anthracene	12		U
191-24-2	Benzo[g,h,i]perylene	19	180	

Qualifier Definitions
 U = Undetected
 B = Compound detected in method blank
 E = Estimated value
 J = Estimated concentration.
 D = Dilution

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SB-11, Grab	
Lab Name:	EMSL ANALYTICAL	Project:	Bronx River Art Center
EMSL Sample ID:	010703726-0006	Sample Matrix:	Soils
Lab File ID:	V11681.D	Sampling Date:	8/17/2007
Instrument ID:	VOA MSD-V	Analysis Date:	8/20/2007 14:45:00
Analyst:	WRF	Level (low/med):	LOW
GC Column:	RTX-502.2 (0.25 mm)	Nominal Amount:	5 G
Sample wt/vol:	5 G	Method:	SW846 8260B
Dilution Factor:	1	Moisture(%)	8
Sample Container:	Jar (SW-846 5035)		
Heated Purge (Y/N):	Y		

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
75-71-8	Dichlorodifluoromethane	1.1		U
74-87-3	Chloromethane	1.1		U
75-01-4	Vinyl chloride	1.1		U
74-83-9	Bromomethane	1.1		U
75-00-3	Chloroethane	1.1		U
75-69-4	Trichlorofluoromethane	1.1		U
107-02-8	Acrolein	54		U
76-13-1	Freon 113(1,1,2-Trichlorotrifluoroethan	1.1		U
75-35-4	1,1-Dichloroethene	1.1		U
67-64-1	Acetone	11	7.9	JB
75-15-0	Carbon disulfide	1.1		U
75-09-2	Methylene chloride	1.1	6.0	
75-65-0	tert-Butyl Alcohol	11		U
156-60-5	trans-1,2-Dichloroethene	1.1		U
1634-04-4	Methyl-tert butyl ether	1.1		U
107-13-1	Acrylonitrile	1.1		U
75-34-3	1,1-Dichloroethane	1.1		U
594-20-7	2,2-Dichloropropane	1.1		U
156-59-2	cis-1,2-Dichloroethene	1.1		U
78-93-3	2-Butanone	2.2		U
74-97-1	Bromochloromethane	1.1		U
67-66-3	Chloroform	1.1		U
71-55-6	1,1,1-Trichloroethane	1.1		U
56-23-1	Carbon tetrachloride	1.1		U
563-58-6	1,1-Dichloropropene	1.1		U
71-43-2	Benzene	0.54		U
107-06-2	1,2-Dichloroethane	1.1		U
79-01-6	Trichloroethene	1.1		U
78-87-1	1,2-Dichloropropane	1.1		U
74-95-3	Dibromomethane	1.1		U
75-27-4	Bromodichloromethane	1.1		U

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name:		Customer Sample#:		SB-11, Grab
EMSL Sample ID:		Project:		Bronx River Art Center
Lab File ID:		Sample Matrix:		Soils
Instrument ID:		Sampling Date:		8/17/2007
Analyst:		Analysis Date		8/20/2007 14:45:00
GC Column:		Level (low/med):		LOW
Sample wt/vol:		Nominal Amount:		5 G
Dilution Factor:		Method:		SW846 8260B
Sample Container:		Moisture(%)		8
Heated Purge (Y/N):		Y		

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
110-75-8	2-Chloroethyl vinyl ether	22		U
10061-01-5	cis-1,3-Dichloropropene	1.1		U
108-10-1	4-Methyl-2-pentanone	11		U
108-88-3	Toluene	1.1		U
10061-02-6	trans-1,3-Dichloropropene	1.1		U
79-00-1	1,1,2-Trichloroethane	1.1		U
127-18-4	Tetrachloroethene	1.1		U
142-28-9	1,3-Dichloropropane	1.1		U
591-78-6	2-Hexanone	11		U
124-48-1	Dibromochloromethane	1.1		U
106-93-4	1,2-Dibromoethane	1.1		U
108-90-7	Chlorobenzene	1.1		U
630-20-6	1,1,1,2-Tetrachloroethane	1.1		U
100-41-4	Ethylbenzene	1.1		U
108-38-3	Xylene (para & meta)	1.1		U
95-47-6	Xylene (Ortho)	1.1		U
100-42-1	Styrene	1.1		U
75-25-2	Bromoform	1.1		U
98-82-8	Isopropylbenzene	1.1		U
108-86-1	Bromobenzene	1.1		U
79-34-1	1,1,2,2-Tetrachloroethane	1.1		U
96-18-4	1,2,3-Trichloropropane	1.1		U
103-65-1	n-Propylbenzene	1.1		U
110-57-6	trans-1,4-Dichloro-2-butene	2.2		U
95-49-8	2-Chlorotoluene	1.1		U
106-43-4	4-Chlorotoluene	1.1		U
108-67-8	1,3,5-Trimethylbenzene	1.1		U
98-06-6	tert-Butylbenzene	1.1		U
95-63-6	1,2,4-Trimethylbenzene	1.1		U
135-98-8	sec-Butylbenzene	1.1		U
541-73-1	1,3-Dichlorobenzene	1.1		U

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SB-11, Grab		
Lab Name:	EMSL ANALYTICAL			
EMSL Sample ID:	010703726-0006	Project:	Bronx River Art Center	
Lab File ID:	V11681.D	Sample Matrix:	Soils	
Instrument ID:	VOA MSD-V	Sampling Date:	8/17/2007	
Analyst:	WRF	Analysis Date:	8/20/2007 14:45:00	
GC Column:	RTX-502.2 (0.25 mm)	Level (low/med):	LOW	
Sample wt/vol:	5 G	Nominal Amount:	5 G	
Dilution Factor:	1	Method:	SW846 8260B	
Sample Container:	Jar (SW-846 5035)	Moisture(%)	8	
Heated Purge (Y/N):	Y			

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
99-87-6	4-Isopropyltoluene	1.1		U
106-46-7	1,4-Dichlorobenzene	1.1		U
95-50-1	1,2-Dichlorobenzene	1.1		U
104-51-8	n-Butylbenzene	1.1		U
96-12-8	1,2-Dibromo-3-chloropropane	1.1		U
120-82-1	1,2,4-Trichlorobenzene	1.1		U
87-68-3	Hexachlorobutadiene	1.1		U
91-20-3	Naphthalene	1.1		U
87-61-6	1,2,3-Trichlorobenzene	1.1		U

Qualifier Definitions
 U = Undetected
 B = Compound detected in method blank
 E = Estimated value
 J = Estimated concentration.
 D = Dilution

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: EMSL Analytical Inc.		Customer Sample#: SB-11, Comp
EMSL Sample ID: 010703726-0007	Project: Bronx River Art Center	
Lab File ID: A08005.D	Sample Matrix: Soils	
Instrument ID: SVOA MSD-A	Sampling Date: 8/17/07	
Analyst: EAA	Date Extracted: 8/21/07	
GC Column: RXI-5MS (0.25 mm)	Analysis Date: 8/21/07 03:50:00 PM	
Level (low/med): LOW	Sample wt/vol: 30.01 G	
% Moisture: 18	Dilution Factor: 1	
PH:	Conc. Extract Volume: 1000 (uL)	
GPC Cleanup(Y/N): N	Injection Volume: 1 (ul)	
Method: SW846 8270BNA	Extraction Type: 3550B	

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
62-75-9	N-nitrosodimethylamine	200		U
108-95-2	Phenol	41		U
100-51-6	Benzyl alcohol	200		U
111-44-4	bis(2-Chloroethyl)ether	200		U
95-57-8	2-Chlorophenol	200		U
541-73-1	1,3-Dichlorobenzene	200		U
106-46-7	1,4-Dichlorobenzene	200		U
95-50-1	1,2-Dichlorobenzene	200		U
95-48-7	2-Methylphenol	41		U
108-60-1	bis(2-chloroisopropyl)ether	200		U
1319-77-3	3+4-Methylphenol	200		U
621-64-7	N-Nitroso-Di-n-propylamine	200		U
67-72-1	Hexachloroethane	200		U
65-85-0	Benzoic Acid	410		U
98-95-3	Nitrobenzene	200		U
78-59-1	Isophorone	200		U
88-75-5	2-Nitrophenol	200		U
105-67-9	2,4-Dimethylphenol	200		U
111-91-1	bis(2-Chloroethoxy)methane	200		U
120-83-2	2,4-Dichlorophenol	200		U
120-82-1	1,2,4-Trichlorobenzene	200		U
91-20-3	Naphthalene	20		U
106-47-8	4-Chloroaniline	200		U
87-68-3	Hexachlorobutadiene	200		U
59-50-7	4-Chloro-3-methylphenol	200		U
91-58-7	2-Chloronaphthalene	200		U
91-57-6	2-Methylnaphthalene	20	970	
77-47-4	Hexachlorocyclopentadiene	200		U
88-06-2	2,4,6-Trichlorophenol	200		U
95-95-4	2,4,5-Trichlorophenol	41		U

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#: SB-11, Comp	
Lab Name: EMSL Analytical Inc.	Project: Bronx River Art Center
EMSL Sample ID: 010703726-0007	Sample Matrix: Soils
Lab File ID: A08005.D	Sampling Date: 8/17/07
Instrument ID: SVOA MSD-A	Date Extracted: 8/21/07
Analyst: EAA	Analysis Date: 8/21/07 03:50:00 PM
GC Column: RXI-5MS (0.25 mm)	Sample wt/vol: 30.01 G
Level (low/med): LOW	Dilution Factor: 1
% Moisture: 18	Conc. Extract Volume: 1000 (uL)
PH:	Injection Volume: 1 (uL)
GPC Cleanup(Y/N): N	Extraction Type: 3550B
Method: SW846 8270BNA	

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
88-74-4	2-Nitroaniline	200		U
131-11-3	Dimethylphthalate	200		U
208-96-8	Acenaphthylene	20	210	
606-20-2	2,6-Dinitrotoluene	200		U
99-09-2	3-Nitroaniline	200		U
83-32-9	Acenaphthene	20	26	
51-28-5	2,4-Dinitrophenol	200		U
100-02-7	4-Nitrophenol	41		U
132-64-9	Dibenzofuran	200	30	J
121-14-2	2,4-Dinitrotoluene	200		U
84-66-2	Diethylphthalate	200		U
86-73-7	Fluorene	20	32	
7005-72-3	4-Chlorophenyl-phenylether	200		U
100-01-6	4-Nitroaniline	200		U
534-52-1	4,6-Dinitro-2-methylphenol	200		U
86-30-6	n-Nitrosodiphenylamine	200		U
122-66-7	1,2-Diphenylhydrazine (as azobenzene)	200		U
101-55-3	4-Bromophenyl-phenylether	200		U
118-74-1	Hexachlorobenzene	200		U
87-86-5	Pentachlorophenol	200		U
85-01-08	Phenanthrene	20	560	
120-12-7	Anthracene	20	95	
86-74-8	Carbazole	200	88	J
84-74-2	Di-n-butylphthalate	200	70	JB
206-44-0	Fluoranthene	20	1200	
92-87-5	Benzidine	200		U
129-00-0	Pyrene	20	830	
85-68-7	Butylbenzylphthalate	200		U
56-55-3	Benzo[a]anthracene	20	320	
91-94-1	3,3'-Dichlorobenzidine	200		U

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: EMSL Analytical Inc.		Customer Sample#: SB-11, Comp
EMSL Sample ID: 010703726-0007	Project: Bronx River Art Center	
Lab File ID: A08005.D	Sample Matrix: Soils	
Instrument ID: SVOA MSD-A	Sampling Date: 8/17/07	
Analyst: EAA	Date Extracted: 8/21/07	
GC Column: RXI-5MS (0.25 mm)	Analysis Date: 8/21/07 03:50:00 PM	
Level (low/med): LOW	Sample wt/vol: 30.01 G	
% Moisture: 18	Dilution Factor: 1	
PH:	Conc. Extract Volume: 1000 (uL)	
GPC Cleanup(Y/N): N	Injection Volume: 1 (ul)	
Method: SW846 8270BNA	Extraction Type: 3550B	

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
218-01-9	Chrysene	20	400	
117-81-7	bis(2-Ethylhexyl)phthalate	200	98	J
117-84-0	Di-n-octylphthalate	200		U
205-99-2	Benzo[b]fluoranthene	20	380	
207-08-9	Benzo[k]fluoranthene	20	380	
50-32-8	Benzo[a]pyrene	20	370	
193-39-5	Indeno[1,2,3-cd]pyrene	20	300	
53-70-3	Dibenz[a,h]anthracene	13		U
191-24-2	Benzo[g,h,i]perylene	20	340	

Qualifier Definitions

U = Undetected
 B = Compound detected in method blank
 E = Estimated value
 J = Estimated concentration.
 D = Dilution

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SB-12, Grab	
Lab Name:	EMSL ANALYTICAL	Project:	Bronx River Art Center
EMSL Sample ID:	010703726-0008	Sample Matrix:	Soils
Lab File ID:	V11682.D	Sampling Date:	8/17/2007
Instrument ID:	VOA MSD-V	Analysis Date:	8/20/2007 15:30:00
Analyst:	WRF	Level (low/med):	LOW
GC Column:	RTX-502.2 (0.25 mm)	Nominal Amount:	5 G
Sample wt/vol:	5 G	Method:	SW846 8260B
Dilution Factor:	1	Moisture(%)	13
Sample Container:	Jar (SW-846 5035)		
Heated Purge (Y/N):	Y		

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
75-71-8	Dichlorodifluoromethane	1.1		U
74-87-3	Chloromethane	1.1		U
75-01-4	Vinyl chloride	1.1		U
74-83-9	Bromomethane	1.1		U
75-00-3	Chloroethane	1.1		U
75-69-4	Trichlorofluoromethane	1.1		U
107-02-8	Acrolein	57		U
76-13-1	Freon 113(1,1,2-Trichlorotrifluoroethan	1.1		U
75-35-4	1,1-Dichloroethene	1.1		U
67-64-1	Acetone	11		U
75-15-0	Carbon disulfide	1.1		U
75-09-2	Methylene chloride	1.1	6.7	
75-65-0	tert-Butyl Alcohol	11		U
156-60-5	trans-1,2-Dichloroethene	1.1		U
1634-04-4	Methyl-tert butyl ether	1.1		U
107-13-1	Acrylonitrile	1.1		U
75-34-3	1,1-Dichloroethane	1.1		U
594-20-7	2,2-Dichloropropane	1.1		U
156-59-2	cis-1,2-Dichloroethene	1.1		U
78-93-3	2-Butanone	2.3		U
74-97-1	Bromochloromethane	1.1		U
67-66-3	Chloroform	1.1		U
71-55-6	1,1,1-Trichloroethane	1.1		U
56-23-1	Carbon tetrachloride	1.1		U
563-58-6	1,1-Dichloropropene	1.1		U
71-43-2	Benzene	0.57		U
107-06-2	1,2-Dichloroethane	1.1		U
79-01-6	Trichloroethene	1.1		U
78-87-1	1,2-Dichloropropane	1.1		U
74-95-3	Dibromomethane	1.1		U
75-27-4	Bromodichloromethane	1.1		U

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: EMSL ANALYTICAL		Customer Sample#: SB-12, Grab
EMSL Sample ID: 010703726-0008	Project: Bronx River Art Center	
Lab File ID: V11682.D	Sample Matrix: Soils	
Instrument ID: VOA MSD-V	Sampling Date: 8/17/2007	
Analyst: WRF	Analysis Date: 8/20/2007 15:30:00	
GC Column: RTX-502.2 (0.25 mm)	Level (low/med): LOW	
Sample wt/vol: 5 G	Nominal Amount: 5 G	
Dilution Factor: 1	Method: SW846 8260B	
Sample Container: Jar (SW-846 5035)	Moisture(%): 13	
Heated Purge (Y/N): Y		

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
110-75-8	2-Chloroethyl vinyl ether	23		U
10061-01-5	cis-1,3-Dichloropropene	1.1		U
108-10-1	4-Methyl-2-pentanone	11		U
108-88-3	Toluene	1.1		U
10061-02-6	trans-1,3-Dichloropropene	1.1		U
79-00-1	1,1,2-Trichloroethane	1.1		U
127-18-4	Tetrachloroethene	1.1		U
142-28-9	1,3-Dichloropropane	1.1		U
591-78-6	2-Hexanone	11		U
124-48-1	Dibromochloromethane	1.1		U
106-93-4	1,2-Dibromoethane	1.1		U
108-90-7	Chlorobenzene	1.1		U
630-20-6	1,1,1,2-Tetrachloroethane	1.1		U
100-41-4	Ethylbenzene	1.1		U
108-38-3	Xylene (para & meta)	1.1		U
95-47-6	Xylene (Ortho)	1.1		U
100-42-1	Styrene	1.1		U
75-25-2	Bromoform	1.1		U
98-82-8	Isopropylbenzene	1.1		U
108-86-1	Bromobenzene	1.1		U
79-34-1	1,1,2,2-Tetrachloroethane	1.1		U
96-18-4	1,2,3-Trichloropropane	1.1		U
103-65-1	n-Propylbenzene	1.1		U
110-57-6	trans-1,4-Dichloro-2-butene	2.3		U
95-49-8	2-Chlorotoluene	1.1		U
106-43-4	4-Chlorotoluene	1.1		U
108-67-8	1,3,5-Trimethylbenzene	1.1		U
98-06-6	tert-Butylbenzene	1.1		U
95-63-6	1,2,4-Trimethylbenzene	1.1		U
135-98-8	sec-Butylbenzene	1.1		U
541-73-1	1,3-Dichlorobenzene	1.1		U

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: EMSL ANALYTICAL		Customer Sample#: SB-12, Grab
EMSL Sample ID: 010703726-0008	Project: Bronx River Art Center	
Lab File ID: V11682.D	Sample Matrix: Soils	
Instrument ID: VOA MSD-V	Sampling Date: 8/17/2007	
Analyst: WRF	Analysis Date: 8/20/2007 15:30:00	
GC Column: RTX-502.2 (0.25 mm)	Level (low/med): LOW	
Sample wt/vol: 5 G	Nominal Amount: 5 G	
Dilution Factor: 1	Method: SW846 8260B	
Sample Container: Jar (SW-846 5035)	Moisture(%) 13	
Heated Purge (Y/N): Y		

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
99-87-6	4-Isopropyltoluene	1.1		U
106-46-7	1,4-Dichlorobenzene	1.1		U
95-50-1	1,2-Dichlorobenzene	1.1		U
104-51-8	n-Butylbenzene	1.1		U
96-12-8	1,2-Dibromo-3-chloropropane	1.1		U
120-82-1	1,2,4-Trichlorobenzene	1.1		U
87-68-3	Hexachlorobutadiene	1.1		U
91-20-3	Naphthalene	1.1		U
87-61-6	1,2,3-Trichlorobenzene	1.1		U

Qualifier Definitions
 U = Undetected
 B = Compound detected in method blank
 E = Estimated value
 J = Estimated concentration.
 D = Dilution

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#: SB-12, Comp	
Lab Name: EMSL Analytical Inc.	
EMSL Sample ID: 010703726-0009	Project: Bronx River Art Center
Lab File ID: A08006.D	Sample Matrix: Soils
Instrument ID: SVOA MSD-A	Sampling Date: 8/17/07
Analyst: EAA	Date Extracted: 8/21/07
GC Column: RXI-5MS (0.25 mm)	Analysis Date: 8/21/07 04:20:00 PM
Level (low/med): LOW	Sample wt/vol: 30.08 G
% Moisture: 9	Dilution Factor: 1
PH:	Conc. Extract Volume: 1000 (uL)
GPC Cleanup(Y/N): N	Injection Volume: 1 (ul)
Method: SW846 8270BNA	Extraction Type: 3550B

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
62-75-9	N-nitrosodimethylamine	180		U
108-95-2	Phenol	37		U
100-51-6	Benzyl alcohol	180		U
111-44-4	bis(2-Chloroethyl)ether	180		U
95-57-8	2-Chlorophenol	180		U
541-73-1	1,3-Dichlorobenzene	180		U
106-46-7	1,4-Dichlorobenzene	180		U
95-50-1	1,2-Dichlorobenzene	180		U
95-48-7	2-Methylphenol	37		U
108-60-1	bis(2-chloroisopropyl)ether	180		U
1319-77-3	3+4-Methylphenol	180		U
621-64-7	N-Nitroso-Di-n-propylamine	180		U
67-72-1	Hexachloroethane	180		U
65-85-0	Benzoic Acid	370		U
98-95-3	Nitrobenzene	180		U
78-59-1	Isophorone	180		U
88-75-5	2-Nitrophenol	180		U
105-67-9	2,4-Dimethylphenol	180		U
111-91-1	bis(2-Chloroethoxy)methane	180		U
120-83-2	2,4-Dichlorophenol	180		U
120-82-1	1,2,4-Trichlorobenzene	180		U
91-20-3	Naphthalene	18		U
106-47-8	4-Chloroaniline	180		U
87-68-3	Hexachlorobutadiene	180		U
59-50-7	4-Chloro-3-methylphenol	180		U
91-58-7	2-Chloronaphthalene	180		U
91-57-6	2-Methylnaphthalene	18		U
77-47-4	Hexachlorocyclopentadiene	180		U
88-06-2	2,4,6-Trichlorophenol	180		U
95-95-4	2,4,5-Trichlorophenol	37		U

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#: SB-12, Comp	
Lab Name:	EMSL Analytical Inc.
EMSL Sample ID:	010703726-0009
Lab File ID:	A08006.D
Instrument ID:	SVOA MSD-A
Analyst:	EAA
GC Column:	RXI-5MS (0.25 mm)
Level (low/med):	LOW
% Moisture:	9
PH:	
GPC Cleanup(Y/N):	N
Method:	SW846 8270BNA
Project:	Bronx River Art Center
Sample Matrix:	Soils
Sampling Date:	8/17/07
Date Extracted:	8/21/07
Analysis Date	8/21/07 04:20:00 PM
Sample wt/vol:	30.08 G
Dilution Factor:	1
Conc. Extract Volume:	1000 (uL)
Injection Volume:	1 (ul)
Extraction Type:	3550B

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
88-74-4	2-Nitroaniline	180		U
131-11-3	Dimethylphthalate	180		U
208-96-8	Acenaphthylene	18	34	
606-20-2	2,6-Dinitrotoluene	180		U
99-09-2	3-Nitroaniline	180		U
83-32-9	Acenaphthene	18		U
51-28-5	2,4-Dinitrophenol	180		U
100-02-7	4-Nitrophenol	37		U
132-64-9	Dibenzofuran	180		U
121-14-2	2,4-Dinitrotoluene	180		U
84-66-2	Diethylphthalate	180		U
86-73-7	Fluorene	18		U
7005-72-3	4-Chlorophenyl-phenylether	180		U
100-01-6	4-Nitroaniline	180		U
534-52-1	4,6-Dinitro-2-methylphenol	180		U
86-30-6	n-Nitrosodiphenylamine	180		U
122-66-7	1,2-Diphenylhydrazine (as azobenzene)	180		U
101-55-3	4-Bromophenyl-phenylether	180		U
118-74-1	Hexachlorobenzene	180		U
87-86-5	Pentachlorophenol	180		U
85-01-08	Phenanthrene	18	55	
120-12-7	Anthracene	18	19	
86-74-8	Carbazole	180		U
84-74-2	Di-n-butylphthalate	180	60	JB
206-44-0	Fluoranthene	18	190	
92-87-5	Benzidine	180		U
129-00-0	Pyrene	18	180	
85-68-7	Butylbenzylphthalate	180		U
56-55-3	Benzo[a]anthracene	18	120	
91-94-1	3,3'-Dichlorobenzidine	180		U

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: EMSL Analytical Inc.		Customer Sample#: SB-12, Comp
EMSL Sample ID: 010703726-0009	Project: Bronx River Art Center	
Lab File ID: A08006.D	Sample Matrix: Soils	
Instrument ID: SVOA MSD-A	Sampling Date: 8/17/07	
Analyst: EAA	Date Extracted: 8/21/07	
GC Column: RXI-5MS (0.25 mm)	Analysis Date: 8/21/07 04:20:00 PM	
Level (low/med): LOW	Sample wt/vol: 30.08 G	
% Moisture: 9	Dilution Factor: 1	
PH:	Conc. Extract Volume: 1000 (uL)	
GPC Cleanup(Y/N): N	Injection Volume: 1 (ul)	
Method: SW846 8270BNA	Extraction Type: 3550B	

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
218-01-9	Chrysene	18	130	
117-81-7	bis(2-Ethylhexyl)phthalate	180	36	J
117-84-0	Di-n-octylphthalate	180		U
205-99-2	Benzo[b]fluoranthene	18	140	
207-08-9	Benzo[k]fluoranthene	18	110	
50-32-8	Benzo[a]pyrene	18	150	
193-39-5	Indeno[1,2,3-cd]pyrene	18	94	
53-70-3	Dibenz[a,h]anthracene	11		U
191-24-2	Benzo[g,h,i]perylene	18	150	

Qualifier Definitions
 U = Undetected
 B = Compound detected in method blank
 E = Estimated value
 J = Estimated concentration.
 D = Dilution

EMSL Analytical, Inc. Environmental Chemistry Lab Service 3 Cooper St., Westmont, NJ 08108 TEL: (856) 858-4800 FAX: (856) 858-4571	Chain of Custody / Analysis Request Form Print ALL Information. Incomplete chain of custody could result in the delay of analysis.		EMSL Project # 010703726 Account Rep: Indicate State where samples were collected:
REPORT RESULTS TO: Name: Steve Frank Company LIR0 Address 690 Delaware Ave City Buffalo State NY Zip Tel: 712 231-3136 Fax:	SEND INVOICE TO: Name: } Company } Address } City } State } Zip Tel: } Fax:	TURNAROUND TIME Standard Turnaround Time is 10 working days The following turnaround times require lab approval: <input type="checkbox"/> 5 day <input type="checkbox"/> 96 Hrs <input type="checkbox"/> 72 Hrs <input type="checkbox"/> 24 Hrs Approved by PROJECT NAME: BRAL Date of Sample Shipment:	2007 01 22 AM 09:56 EMSL WESTMONT, N.J.
Email: Franks @ LIR0.COM			

Sampled by: (Signature) <i>Nank C61</i>		Matrix							Preservative				Sampling		List Method and Test Needed														
Lab Sample Number	Client Sample ID	Comp	Grab					WATER	SOIL	AIR	SLUDGE	OTHER	HCl	HNO ₃	H ₂ SO ₄	OTHER	DATE	TIME	VOC	SVOC	Pesticides	Metals							
1.	SB-9 / TWP-3		X					X									8/17		X										
2.	SB-9 / TWP-3	X						X																					
3.	SB-9 / TWP-3							X																					
4.	SB-10		X					X											X										
5.	SB-10	X						X											X										
6.	SB-11		X					X											X										
7.	SB-11	X						X											X										
8.	SB-12		X					X											X										
9.	SB-12	X						X											X										
10.																													
Released By Signature		Date & Time Released		Delivery Method		Received By Signature		Agency		Date & Time Received		Condition Noted																	
<i>[Signature]</i>						<i>[Signature]</i>		<i>EMS</i>		8/17/07 6:20																			
										8/20/07		H ₂ O = blue																	

Please indicate reporting requirements: ☐ 1. Results Only ☐ 2. Results and QC ☐ 3. Reduced Deliverables ☐ 4. Disk Deliverable ☐ 5. Other

Comments:

EMSL Analytical

<http://www.emsl.com>

3 Cooper St.
Westmont, NJ 08108
Phone: (856) 858-4800
Fax: 8568584571

EMSL

Attn: **Bob Kreuzer**
Liro Group
690 Delaware Avenue
Buffalo, NY 14209

8/27/2007

Phone (716) 882-5476

Fax: (716) 882-9640

The following report covers the analysis performed on samples submitted to EMSL Analytical on 8/21/2007. The results are tabulated on the attached data pages for the following client designated project:

Project ID: Bronx River Art Center

The reference number for these samples is EMSL Order #010703757. Please use this reference when calling about these samples.

If you have any questions, please do not hesitate to contact me at (856) 858-4800.

Reviewed and Approved By:

Laboratory Director or other
approved signatory
NJ-NELAP Accredited:04653



The test results contained within this report meet the requirements of NELAC and/or the specific certification program that is applicable, unless otherwise noted.

**EMSL Analytical**

3 Cooper St., Westmont, NJ 08108

Phone: (856) 858-4800 Fax: (856) 858-4571 Email: jsmith@emsl.com

EMSL

SM

Attn: **Bob Kreuzer**
Liro Group
690 Delaware Avenue
Buffalo, NY 14209

Customer ID: LIRO50
Customer PO:
Received: 08/21/07 10:35 AM
EMSL Order: 010703757
EMSL Proj: Bronx River Art Center
Report Date: 8/27/2007

Fax: (716) 882-9640

Phone: (716) 882-5476

Client Sample Description SS1**Collected:** 8/20/2007**Lab ID:** 0001

<i>Test</i>	<i>Method</i>	<i>Parameter</i>	<i>Concentration</i>	<i>Units</i>	<i>RL</i>	<i>Analysis Date/Time</i>	<i>Analyst</i>
C-Total Solids	2540B	Total Solids	82	%	0.5	8/21/2007 02:15 PM	tlech
C-TAL Metals-C-Metals by ICP	6010B	Aluminum	5900	mg/Kg	9.1	8/23/2007 11:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Antimony	4.7	mg/Kg	1.8	8/23/2007 11:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Arsenic	<0.72	mg/Kg	0.72	8/23/2007 11:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Barium	62	mg/Kg	9.1	8/23/2007 11:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Beryllium	<0.36	mg/Kg	0.36	8/23/2007 11:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Cadmium	0.70	mg/Kg	0.36	8/23/2007 11:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Calcium	15000	mg/Kg	91	8/23/2007 11:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Chromium	14	mg/Kg	0.91	8/23/2007 11:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Cobalt	3.4	mg/Kg	0.91	8/23/2007 11:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Copper	69	mg/Kg	1.8	8/23/2007 11:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Iron	15000	mg/Kg	9.1	8/23/2007 11:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Lead	330	mg/Kg	0.91	8/23/2007 11:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Magnesium-R	9300	mg/Kg	91	8/23/2007 11:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Manganese	210	mg/Kg	1.4	8/23/2007 11:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Nickel	7.7	mg/Kg	1.8	8/23/2007 11:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Potassium	760	mg/Kg	91	8/23/2007 11:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Selenium	<1.8	mg/Kg	1.8	8/23/2007 11:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Silver	2.5	mg/Kg	0.91	8/23/2007 11:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Sodium	160	mg/Kg	91	8/23/2007 11:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Thallium	<0.91	mg/Kg	0.91	8/23/2007 11:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Vanadium	14	mg/Kg	0.91	8/23/2007 11:28 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Zinc	300	mg/Kg	1.8	8/23/2007 11:28 PM	rferrer
C-TAL Metals-Mercury, Total	7471A	Mercury	0.46	mg/Kg	0.022	8/23/2007 11:25 AM	dhemsley
VOA	8260B	See Attached			N/A	8/21/2007 06:00 PM	afalasca
SVOA	8270C TCL	See Attached			N/A	8/23/2007 01:48 PM	eayres

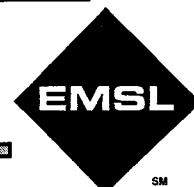
**EMSL Analytical**

3 Cooper St., Westmont, NJ 08108

Phone: (856) 858-4800

Fax: (856) 858-4571

Email: jsmith@emsl.com



Attn: **Bob Kreuzer**
Liro Group
690 Delaware Avenue
Buffalo, NY 14209

Fax: (716) 882-9640

Phone: (716) 882-5476

Customer ID: LIRO50

Customer PO:

Received: 08/21/07 10:35 AM

EMSL Order: 010703757

EMSL Proj: Bronx River Art Center

Report Date: 8/27/2007

Client Sample Description		SS2	Collected:		8/20/2007	Lab ID:		0002
Test	Method	Parameter	Concentration	Units	RL	Analysis Date/Time	Analyst	
C-Total Solids	2540B	Total Solids	87	%	0.5	8/21/2007 02:15 PM	tlech	
C-TAL Metals-C-Metals by ICP	6010B	Aluminum	5300	mg/Kg	9.1	8/23/2007 11:36 PM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Antimony	6.4	mg/Kg	1.8	8/23/2007 11:36 PM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Arsenic	<0.73	mg/Kg	0.73	8/23/2007 11:36 PM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Barium	100	mg/Kg	9.1	8/23/2007 11:36 PM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Beryllium	<0.36	mg/Kg	0.36	8/23/2007 11:36 PM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Cadmium	1.2	mg/Kg	0.36	8/23/2007 11:36 PM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Calcium	14000	mg/Kg	91	8/23/2007 11:36 PM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Chromium	14	mg/Kg	0.91	8/23/2007 11:36 PM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Cobalt	4.5	mg/Kg	0.91	8/23/2007 11:36 PM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Copper	37	mg/Kg	1.8	8/23/2007 11:36 PM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Iron	14000	mg/Kg	9.1	8/23/2007 11:36 PM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Lead	340	mg/Kg	0.91	8/23/2007 11:36 PM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Magnesium-R	4900	mg/Kg	91	8/23/2007 11:36 PM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Manganese	210	mg/Kg	1.4	8/23/2007 11:36 PM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Nickel	8.0	mg/Kg	1.8	8/23/2007 11:36 PM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Potassium	1500	mg/Kg	91	8/23/2007 11:36 PM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Selenium	<1.8	mg/Kg	1.8	8/23/2007 11:36 PM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Silver	2.9	mg/Kg	0.91	8/23/2007 11:36 PM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Sodium	210	mg/Kg	91	8/23/2007 11:36 PM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Thallium	<0.91	mg/Kg	0.91	8/23/2007 11:36 PM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Vanadium	15	mg/Kg	0.91	8/23/2007 11:36 PM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Zinc	140	mg/Kg	1.8	8/23/2007 11:36 PM	rferrer	
C-TAL Metals-Mercury, Total	7471A	Mercury	2.8	mg/Kg	0.022	8/23/2007 12:17 PM	dhemsley	
VOA	8260B	See Attached			N/A	8/22/2007 03:01 PM	afalasca	
SVOA	8270C TCL	See Attached			N/A	8/23/2007 09:16 PM	eayres	

**EMSL Analytical**

3 Cooper St., Westmont, NJ 08108

Phone: (856) 858-4800 Fax: (856) 858-4571 Email: jsmith@emsl.com



Attn: **Bob Kreuzer**
Liro Group
690 Delaware Avenue
Buffalo, NY 14209

Customer ID: LIRO50
Customer PO:
Received: 08/21/07 10:35 AM
EMSL Order: 010703757

EMSL Proj: Bronx River Art Center

Report Date: 8/27/2007

Fax: (716) 882-9640

Phone: (716) 882-5476

Client Sample Description SS3

Collected: 8/20/2007

Lab ID: 0003

Test	Method	Parameter	Concentration	Units	RL	Analysis Date/Time	Analyst
C-Total Solids	2540B	Total Solids	79	%	0.5	8/21/2007 02:15 PM	tlech
C-TAL Metals-C-Metals by ICP	6010B	Aluminum	3700	mg/Kg	9.8	8/23/2007 11:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Antimony	<2.0	mg/Kg	2.0	8/23/2007 11:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Arsenic	<0.78	mg/Kg	0.78	8/23/2007 11:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Barium	15	mg/Kg	9.8	8/23/2007 11:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Beryllium	<0.39	mg/Kg	0.39	8/23/2007 11:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Cadmium	<0.39	mg/Kg	0.39	8/23/2007 11:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Calcium	340	mg/Kg	98	8/23/2007 11:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Chromium	8.3	mg/Kg	0.98	8/23/2007 11:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Cobalt	2.2	mg/Kg	0.98	8/23/2007 11:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Copper	2.5	mg/Kg	2.0	8/23/2007 11:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Iron	7100	mg/Kg	9.8	8/23/2007 11:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Lead	<0.98	mg/Kg	0.98	8/23/2007 11:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Magnesium	1400	mg/Kg	98	8/23/2007 11:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Manganese	56	mg/Kg	1.5	8/23/2007 11:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Nickel	4.3	mg/Kg	2.0	8/23/2007 11:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Potassium	420	mg/Kg	98	8/23/2007 11:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Selenium	<2.0	mg/Kg	2.0	8/23/2007 11:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Silver	1.3	mg/Kg	0.98	8/23/2007 11:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Sodium	110	mg/Kg	98	8/23/2007 11:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Thallium	<0.98	mg/Kg	0.98	8/23/2007 11:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Vanadium	8.1	mg/Kg	0.98	8/23/2007 11:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Zinc	15	mg/Kg	2.0	8/23/2007 11:44 PM	rferrer
C-TAL Metals-Mercury, Total	7471A	Mercury	<0.025	mg/Kg	0.025	8/23/2007 11:46 AM	dhemsley
VOA	8260B	See Attached			N/A	8/21/2007 05:48 PM	afalasca
SVOA	8270C TCL	See Attached			N/A	8/22/2007 05:44 PM	eayres

**EMSL Analytical**

3 Cooper St., Westmont, NJ 08108

Phone: (856) 858-4800 Fax: (856) 858-4571 Email: jsmith@emsl.com



Attn: **Bob Kreuzer**
Liro Group
690 Delaware Avenue
Buffalo, NY 14209

Fax: (716) 882-9640

Phone: (716) 882-5476

Customer ID: LIRO50
Customer PO:
Received: 08/21/07 10:35 AM
EMSL Order: 010703757
EMSL Proj: Bronx River Art Center

Report Date: 8/27/2007

Client Sample Description		SS4	Collected:		8/20/2007	Lab ID: 0004	
Test	Method	Parameter	Concentration	Units	RL	Analysis Date/Time	Analyst
C-Total Solids	2540B	Total Solids	81	%	0.5	8/21/2007 02:15 PM	tlech
C-TAL Metals-C-Metals by ICP	6010B	Aluminum	5500	mg/Kg	9.3	8/23/2007 11:52 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Antimony	2.2	mg/Kg	1.9	8/23/2007 11:52 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Arsenic	<0.75	mg/Kg	0.75	8/23/2007 11:52 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Barium	14	mg/Kg	9.3	8/23/2007 11:52 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Beryllium	<0.37	mg/Kg	0.37	8/23/2007 11:52 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Cadmium	<0.37	mg/Kg	0.37	8/23/2007 11:52 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Calcium	450	mg/Kg	93	8/23/2007 11:52 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Chromium	12	mg/Kg	0.93	8/23/2007 11:52 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Cobalt	3.7	mg/Kg	0.93	8/23/2007 11:52 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Copper	4.7	mg/Kg	1.9	8/23/2007 11:52 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Iron	12000	mg/Kg	9.3	8/23/2007 11:52 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Lead	<0.93	mg/Kg	0.93	8/23/2007 11:52 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Magnesium-R	2300	mg/Kg	93	8/23/2007 11:52 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Manganese	98	mg/Kg	1.4	8/23/2007 11:52 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Nickel	6.5	mg/Kg	1.9	8/23/2007 11:52 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Potassium	420	mg/Kg	93	8/23/2007 11:52 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Selenium	<1.9	mg/Kg	1.9	8/23/2007 11:52 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Silver	1.5	mg/Kg	0.93	8/23/2007 11:52 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Sodium	130	mg/Kg	93	8/23/2007 11:52 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Thallium	<0.93	mg/Kg	0.93	8/23/2007 11:52 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Vanadium	13	mg/Kg	0.93	8/23/2007 11:52 PM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Zinc	22	mg/Kg	1.9	8/23/2007 11:52 PM	rferrer
C-TAL Metals-Mercury, Total	7471A	Mercury	<0.022	mg/Kg	0.022	8/23/2007 11:48 AM	dhemsley
VOA	8260B	See Attached			N/A	8/21/2007 07:28 PM	afalasca
Sample failed Surrogate criteria, confirmed failure due to matrix interference.							
SVOA	8270C TCL	See Attached			N/A	8/23/2007 12:49 PM	eayres

**EMSL Analytical**

3 Cooper St., Westmont, NJ 08108

Phone: (856) 858-4800 Fax: (856) 858-4571 Email: jsmith@emsl.com



Attn: **Bob Kreuzer**
Liro Group
690 Delaware Avenue
Buffalo, NY 14209

Fax: (716) 882-9640

Phone: (716) 882-5476

Customer ID: LIRO50
Customer PO:
Received: 08/21/07 10:35 AM
EMSL Order: 010703757

EMSL Proj: Bronx River Art Center

Report Date: 8/27/2007

Client Sample Description		SS5	Collected:		8/20/2007	Lab ID:		0005
Test	Method	Parameter	Concentration	Units	RL	Analysis Date/Time	Analyst	
C-Total Solids	2540B	Total Solids	82	%	0.5	8/21/2007 02:15 PM	tlech	
C-TAL Metals-C-Metals by ICP	6010B	Aluminum	6700	mg/Kg	8.7	8/24/2007 12:06 AM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Antimony	2.6	mg/Kg	1.7	8/24/2007 12:06 AM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Arsenic	<0.70	mg/Kg	0.70	8/24/2007 12:06 AM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Barium	48	mg/Kg	8.7	8/24/2007 12:06 AM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Beryllium	<0.35	mg/Kg	0.35	8/24/2007 12:06 AM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Cadmium	<0.35	mg/Kg	0.35	8/24/2007 12:06 AM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Calcium	1800	mg/Kg	87	8/24/2007 12:06 AM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Chromium	16	mg/Kg	0.87	8/24/2007 12:06 AM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Cobalt	4.7	mg/Kg	0.87	8/24/2007 12:06 AM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Copper	21	mg/Kg	1.7	8/24/2007 12:06 AM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Iron	13000	mg/Kg	8.7	8/24/2007 12:06 AM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Lead	91	mg/Kg	0.87	8/24/2007 12:06 AM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Magnesium-R	2400	mg/Kg	87	8/24/2007 12:06 AM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Manganese	180	mg/Kg	1.3	8/24/2007 12:06 AM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Nickel	9.7	mg/Kg	1.7	8/24/2007 12:06 AM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Potassium	990	mg/Kg	87	8/24/2007 12:06 AM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Selenium	<1.7	mg/Kg	1.7	8/24/2007 12:06 AM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Silver	1.5	mg/Kg	0.87	8/24/2007 12:06 AM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Sodium	140	mg/Kg	87	8/24/2007 12:06 AM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Thallium	<0.87	mg/Kg	0.87	8/24/2007 12:06 AM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Vanadium	17	mg/Kg	0.87	8/24/2007 12:06 AM	rferrer	
C-TAL Metals-C-Metals by ICP	6010B	Zinc	56	mg/Kg	1.7	8/24/2007 12:06 AM	rferrer	
C-TAL Metals-Mercury, Total	7471A	Mercury	3.8	mg/Kg	0.023	8/23/2007 12:19 PM	dhemsley	
VOA	8260B	See Attached			N/A	8/21/2007 08:12 PM	afalasca	
SVOA	8270C TCL	See Attached			N/A	8/23/2007 01:19 PM	eayres	

**EMSL Analytical**

3 Cooper St., Westmont, NJ 08108

Phone: (856) 858-4800 Fax: (856) 858-4571 Email: jsmith@emsl.com



Attn: **Bob Kreuzer**
Liro Group
690 Delaware Avenue
Buffalo, NY 14209

Fax: (716) 882-9640

Phone: (716) 882-5476

Customer ID: LIRO50

Customer PO:

Received: 08/21/07 10:35 AM

EMSL Order: 010703757

EMSL Proj: Bronx River Art Center

Report Date: 8/27/2007

Client Sample Description SS6

Collected: 8/20/2007

Lab ID: 0006

Test	Method	Parameter	Concentration	Units	RL	Analysis Date/Time	Analyst
C-Total Solids	2540B	Total Solids	85	%	0.5	8/21/2007 02:15 PM	tlech
C-TAL Metals-C-Metals by ICP	6010B	Aluminum	5500	mg/Kg	9.5	8/24/2007 12:08 AM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Antimony	5.6	mg/Kg	1.9	8/24/2007 12:08 AM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Arsenic	<0.76	mg/Kg	0.76	8/24/2007 12:08 AM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Barium	300	mg/Kg	9.5	8/24/2007 12:08 AM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Beryllium	<0.38	mg/Kg	0.38	8/24/2007 12:08 AM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Cadmium	2.1	mg/Kg	0.38	8/24/2007 12:08 AM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Calcium	8500	mg/Kg	95	8/24/2007 12:08 AM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Chromium	18	mg/Kg	0.95	8/24/2007 12:08 AM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Cobalt	4.0	mg/Kg	0.95	8/24/2007 12:08 AM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Copper	87	mg/Kg	1.9	8/24/2007 12:08 AM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Iron	18000	mg/Kg	9.5	8/24/2007 12:08 AM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Lead	2100	mg/Kg	0.95	8/24/2007 12:08 AM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Magnesium	1200	mg/Kg	95	8/24/2007 12:08 AM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Manganese	170	mg/Kg	1.4	8/24/2007 12:08 AM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Nickel	10	mg/Kg	1.9	8/24/2007 12:08 AM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Potassium	1400	mg/Kg	95	8/24/2007 12:08 AM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Selenium	<1.9	mg/Kg	1.9	8/24/2007 12:08 AM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Silver	2.1	mg/Kg	0.95	8/24/2007 12:08 AM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Sodium	250	mg/Kg	95	8/24/2007 12:08 AM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Thallium	<0.95	mg/Kg	0.95	8/24/2007 12:08 AM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Vanadium	15	mg/Kg	0.95	8/24/2007 12:08 AM	rferrer
C-TAL Metals-C-Metals by ICP	6010B	Zinc	1300	mg/Kg	1.9	8/24/2007 12:08 AM	rferrer
C-TAL Metals-Mercury, Total	7471A	Mercury	1.8	mg/Kg	0.023	8/23/2007 12:21 PM	dhemsley
VOA	8260B	See Attached			N/A	8/21/2007 08:56 PM	afalasca
SVOA	8270C TCL	See Attached			N/A	8/23/2007 10:16 PM	eayres

The internal standard fell outside control limits (high) on both the initial and reanalysis.

**EMSL Analytical**

3 Cooper St., Westmont, NJ 08108

Phone: (856) 858-4800 Fax: (856) 858-4571 Email: jsmith@emsl.com



Attn: **Bob Kreuzer**
Liro Group
690 Delaware Avenue
Buffalo, NY 14209

Customer ID: LIRO50
Customer PO:
Received: 08/21/07 10:35 AM
EMSL Order: 010703757
EMSL Proj: Bronx River Art Center
Report Date: 8/27/2007

Fax: (716) 882-9640

Phone: (716) 882-5476

Client Sample Description		SS7	Collected:		8/20/2007		Lab ID:		0007	
Test	Method	Parameter	Concentration	Units	RL	Analysis Date/Time	Analyst			
C-Total Solids	2540B	Total Solids	88	%	0.5	8/21/2007 02:15 PM	tlech			
C-TAL Metals-C-Metals by ICP	6010B	Aluminum	10000	mg/Kg	9.9	8/24/2007 12:16 AM	rferrer			
C-TAL Metals-C-Metals by ICP	6010B	Antimony	3.7	mg/Kg	2.0	8/24/2007 12:16 AM	rferrer			
C-TAL Metals-C-Metals by ICP	6010B	Arsenic	<0.79	mg/Kg	0.79	8/24/2007 12:16 AM	rferrer			
C-TAL Metals-C-Metals by ICP	6010B	Barium	160	mg/Kg	9.9	8/24/2007 12:16 AM	rferrer			
C-TAL Metals-C-Metals by ICP	6010B	Beryllium	<0.40	mg/Kg	0.40	8/24/2007 12:16 AM	rferrer			
C-TAL Metals-C-Metals by ICP	6010B	Cadmium	<0.40	mg/Kg	0.40	8/24/2007 12:16 AM	rferrer			
C-TAL Metals-C-Metals by ICP	6010B	Calcium	2800	mg/Kg	99	8/24/2007 12:16 AM	rferrer			
C-TAL Metals-C-Metals by ICP	6010B	Chromium	24	mg/Kg	0.99	8/24/2007 12:16 AM	rferrer			
C-TAL Metals-C-Metals by ICP	6010B	Cobalt	8.0	mg/Kg	0.99	8/24/2007 12:16 AM	rferrer			
C-TAL Metals-C-Metals by ICP	6010B	Copper	40	mg/Kg	2.0	8/24/2007 12:16 AM	rferrer			
C-TAL Metals-C-Metals by ICP	6010B	Iron	22000	mg/Kg	9.9	8/24/2007 12:16 AM	rferrer			
C-TAL Metals-C-Metals by ICP	6010B	Lead	220	mg/Kg	0.99	8/24/2007 12:16 AM	rferrer			
C-TAL Metals-C-Metals by ICP	6010B	Magnesium-R	4000	mg/Kg	99	8/24/2007 12:16 AM	rferrer			
C-TAL Metals-C-Metals by ICP	6010B	Manganese	460	mg/Kg	1.5	8/24/2007 12:16 AM	rferrer			
C-TAL Metals-C-Metals by ICP	6010B	Nickel	14	mg/Kg	2.0	8/24/2007 12:16 AM	rferrer			
C-TAL Metals-C-Metals by ICP	6010B	Potassium	3900	mg/Kg	99	8/24/2007 12:16 AM	rferrer			
C-TAL Metals-C-Metals by ICP	6010B	Selenium	<2.0	mg/Kg	2.0	8/24/2007 12:16 AM	rferrer			
C-TAL Metals-C-Metals by ICP	6010B	Silver	13	mg/Kg	0.99	8/24/2007 12:16 AM	rferrer			
C-TAL Metals-C-Metals by ICP	6010B	Sodium	510	mg/Kg	99	8/24/2007 12:16 AM	rferrer			
C-TAL Metals-C-Metals by ICP	6010B	Thallium	<0.99	mg/Kg	0.99	8/24/2007 12:16 AM	rferrer			
C-TAL Metals-C-Metals by ICP	6010B	Vanadium	28	mg/Kg	0.99	8/24/2007 12:16 AM	rferrer			
C-TAL Metals-C-Metals by ICP	6010B	Zinc	180	mg/Kg	2.0	8/24/2007 12:16 AM	rferrer			
C-TAL Metals-Mercury, Total	7471A	Mercury	0.30	mg/Kg	0.023	8/23/2007 11:54 AM	dhemsley			
VOA	8260B	See Attached			N/A	8/21/2007 09:40 PM	afalasca			
SVOA	8270C TCL	See Attached			N/A	8/23/2007 09:46 PM	eayres			

**EMSL Analytical**

3 Cooper St., Westmont, NJ 08108

Phone: (856) 858-4800 Fax: (856) 858-4571 Email: jsmith@emsl.com



Attn: **Bob Kreuzer**
Liro Group
690 Delaware Avenue
Buffalo, NY 14209

Fax: (716) 882-9640

Phone: (716) 882-5476

Customer ID: LIRO50

Customer PO:

Received: 08/21/07 10:35 AM

EMSL Order: 010703757

EMSL Proj: Bronx River Art Center

Report Date: 8/27/2007

Client Sample Description Twp-4

Collected: 8/20/2007

Lab ID: 0008

Test	Method	Parameter	Concentration	Units	RL	Analysis Date/Time	Analyst
C-TAL Metals-C-Metals by ICP	200.7	Aluminum	260	mg/L	0.10	8/23/2007 07:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Antimony	<0.020	mg/L	0.020	8/23/2007 07:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Arsenic	<0.0080	mg/L	0.0080	8/23/2007 07:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Barium	5.6	mg/L	0.10	8/23/2007 07:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Beryllium	0.012	mg/L	0.0040	8/23/2007 07:44 PM	rferrer
Batch RL was biased low 65.1%.							
C-TAL Metals-C-Metals by ICP	200.7	Cadmium	0.0087	mg/L	0.0040	8/23/2007 07:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Calcium	550	mg/L	1.0	8/23/2007 07:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Chromium	0.68	mg/L	0.010	8/23/2007 07:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Cobalt	0.30	mg/L	0.010	8/23/2007 07:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Copper	1.9	mg/L	0.020	8/23/2007 07:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Iron	360	mg/L	0.10	8/23/2007 07:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Lead	1.8	mg/L	0.010	8/23/2007 07:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Magnesium-R	98	mg/L	1.0	8/23/2007 07:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Manganese	18	mg/L	0.015	8/23/2007 07:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Nickel	0.43	mg/L	0.020	8/23/2007 07:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Potassium	52	mg/L	1.0	8/23/2007 07:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Selenium	<0.020	mg/L	0.020	8/23/2007 07:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Silver	0.028	mg/L	0.010	8/23/2007 07:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Sodium	99	mg/L	1.0	8/23/2007 07:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Thallium	<0.010	mg/L	0.010	8/23/2007 07:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Vanadium	0.43	mg/L	0.010	8/23/2007 07:44 PM	rferrer
C-TAL Metals-C-Metals by ICP	200.7	Zinc	1.1	mg/L	0.020	8/23/2007 07:44 PM	rferrer
C-TAL Metals-Mercury, Total	245.1	Hg	0.0066	mg/L	0.00020	8/24/2007 11:07 AM	dhemsley
SVOA	625	See Attached			N/A	8/26/2007 10:10 PM	eayres
VOA	8260B	See Attached			N/A	8/21/2007 05:07 PM	afalasca

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SS1	
Lab Name:	EMSL ANALYTICAL	Project:	Bronx River Art Center
EMSL Sample ID:	010703757-0001	Sample Matrix:	Soils
Lab File ID:	V11703.D	Sampling Date:	8/20/2007
Instrument ID:	VOA MSD-V	Analysis Date:	8/21/2007 18:00:00
Analyst:	WRF	Level (low/med):	LOW
GC Column:	RTX-502.2 (0.25 mm)	Nominal Amount:	5 G
Sample wt/vol:	5 G	Method:	SW846 8260B
Dilution Factor:	1	Moisture(%)	18
Sample Container:	Jar (SW-846 5035)		
Heated Purge (Y/N):	Y		

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
75-71-8	Dichlorodifluoromethane	1.2		U
74-87-3	Chloromethane	1.2		U
75-01-4	Vinyl chloride	1.2		U
74-83-9	Bromomethane	1.2		U
75-00-3	Chloroethane	1.2		U
75-69-4	Trichlorofluoromethane	1.2		U
107-02-8	Acrolein	61		U
76-13-1	Freon 113(1,1,2-Trichlorotrifluoroethane)	1.2		U
75-35-4	1,1-Dichloroethene	1.2		U
67-64-1	Acetone	12	17	
75-15-0	Carbon disulfide	1.2		U
75-09-2	Methylene chloride	1.2	6.4	B
75-65-0	tert-Butyl Alcohol	12		U
156-60-5	trans-1,2-Dichloroethene	1.2		U
1634-04-4	Methyl-tert butyl ether	1.2		U
107-13-1	Acrylonitrile	1.2		U
75-34-3	1,1-Dichloroethane	1.2		U
594-20-7	2,2-Dichloropropane	1.2		U
156-59-2	cis-1,2-Dichloroethene	1.2		U
78-93-3	2-Butanone	2.4		U
74-97-1	Bromochloromethane	1.2		U
67-66-3	Chloroform	1.2		U
71-55-6	1,1,1-Trichloroethane	1.2		U
56-23-1	Carbon tetrachloride	1.2		U
563-58-6	1,1-Dichloropropene	1.2		U
71-43-2	Benzene	0.61		U
107-06-2	1,2-Dichloroethane	1.2		U
79-01-6	Trichloroethene	1.2		U
78-87-1	1,2-Dichloropropane	1.2		U
74-95-3	Dibromomethane	1.2		U
75-27-4	Bromodichloromethane	1.2		U
110-75-8	2-Chloroethyl vinyl ether	24		U
10061-01-5	cis-1,3-Dichloropropene	1.2		U

Printed: 08/22/07 02:56:20 PM

FORM1--VOA

SampleList: 082107VA

ERM: V:\VOAERMS\8260ERMS\8260.erm

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SS1	
Lab Name:	EMSL ANALYTICAL	Project:	Bronx River Art Center
EMSL Sample ID:	010703757-0001	Sample Matrix:	Soils
Lab File ID:	V11703.D	Sampling Date:	8/20/2007
Instrument ID:	VOA MSD-V	Analysis Date:	8/21/2007 18:00:00
Analyst:	WRF	Level (low/med):	LOW
GC Column:	RTX-502.2 (0.25 mm)	Nominal Amount:	5 G
Sample wt/vol:	5 G	Method:	SW846 8260B
Dilution Factor:	1	Moisture(%)	18
Sample Container:	Jar (SW-846 5035)		
Heated Purge (Y/N):	Y		

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
108-10-1	4-Methyl-2-pentanone	12		U
108-88-3	Toluene	1.2		U
10061-02-6	trans-1,3-Dichloropropene	1.2		U
79-00-1	1,1,2-Trichloroethane	1.2		U
127-18-4	Tetrachloroethene	1.2		U
142-28-9	1,3-Dichloropropane	1.2		U
591-78-6	2-Hexanone	12		U
124-48-1	Dibromochloromethane	1.2		U
106-93-4	1,2-Dibromoethane	1.2		U
108-90-7	Chlorobenzene	1.2		U
630-20-6	1,1,1,2-Tetrachloroethane	1.2		U
100-41-4	Ethylbenzene	1.2		U
108-38-3	Xylene (para & meta)	1.2		U
95-47-6	Xylene (Ortho)	1.2		U
100-42-1	Styrene	1.2		U
75-25-2	Bromoform	1.2		U
98-82-8	Isopropylbenzene	1.2		U
108-86-1	Bromobenzene	1.2		U
79-34-1	1,1,2,2-Tetrachloroethane	1.2		U
96-18-4	1,2,3-Trichloropropane	1.2		U
103-65-1	n-Propylbenzene	1.2		U
110-57-6	trans-1,4-Dichloro-2-butene	2.4		U
95-49-8	2-Chlorotoluene	1.2		U
106-43-4	4-Chlorotoluene	1.2		U
108-67-8	1,3,5-Trimethylbenzene	1.2		U
98-06-6	tert-Butylbenzene	1.2		U
95-63-6	1,2,4-Trimethylbenzene	1.2		U
135-98-8	sec-Butylbenzene	1.2		U
541-73-1	1,3-Dichlorobenzene	1.2		U
99-87-6	4-Isopropyltoluene	1.2		U
106-46-7	1,4-Dichlorobenzene	1.2		U
95-50-1	1,2-Dichlorobenzene	1.2		U
104-51-8	n-Butylbenzene	1.2		U

Printed: 08/22/07 02:56:20 PM

FORM1--VOA

SampleList: 082107VA

ERM: V:\VOAERMS\8260ERMS\8260.erm

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SS1		
Lab Name:	EMSL ANALYTICAL	Project:	Bronx River Art Center	
EMSL Sample ID:	010703757-0001	Sample Matrix:	Soils	
Lab File ID:	V11703.D	Sampling Date:	8/20/2007	
Instrument ID:	VOA MSD-V	Analysis Date:	8/21/2007 18:00:00	
Analyst:	WRF	Level (low/med):	LOW	
GC Column:	RTX-502.2 (0.25 mm)	Nominal Amount:	5 G	
Sample wt/vol:	5 G	Method:	SW846 8260B	
Dilution Factor:	1	Moisture(%)	18	
Sample Container:	Jar (SW-846 5035)			
Heated Purge (Y/N):	Y			

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
96-12-8	1,2-Dibromo-3-chloropropane	1.2		U
120-82-1	1,2,4-Trichlorobenzene	1.2		U
87-68-3	Hexachlorobutadiene	1.2		U
91-20-3	Naphthalene	1.2		U
87-61-6	1,2,3-Trichlorobenzene	1.2		U

Qualifier Definitions
 U = Undetected
 B = Compound detected in method blank
 E = Estimated value
 J = Estimated concentration.
 D = Dilution

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#: SS1	
Lab Name:	EMSL Analytical Inc.
EMSL Sample ID:	010703757-0001
Project:	Bronx River Art Center
Lab File ID:	A08042.D
Sample Matrix:	Soils
Instrument ID:	SVOA MSD-A
Sampling Date:	8/20/07
Analyst:	EAA
Date Extracted:	8/22/07
GC Column:	RXI-5MS (0.25 mm)
Analysis Date:	8/23/07 01:48:00 PM
Level (low/med):	LOW
Sample wt/vol:	30.08 G
% Moisture:	18
Dilution Factor:	1
PH:	
Conc. Extract Volume:	1000 (uL)
GPC Cleanup(Y/N):	N
Injection Volume:	1 (ul)
Method:	SW846 8270BNA
Extraction Type:	3550B

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
62-75-9	N-nitrosodimethylamine	200		U
108-95-2	Phenol	41		U
100-51-6	Benzyl alcohol	200		U
111-44-4	bis(2-Chloroethyl)ether	200		U
95-57-8	2-Chlorophenol	200		U
541-73-1	1,3-Dichlorobenzene	200		U
106-46-7	1,4-Dichlorobenzene	200		U
95-50-1	1,2-Dichlorobenzene	200		U
95-48-7	2-Methylphenol	41		U
108-60-1	bis(2-chloroisopropyl)ether	200		U
1319-77-3	3+4-Methylphenol	200		U
621-64-7	N-Nitroso-Di-n-propylamine	200		U
67-72-1	Hexachloroethane	200		U
65-85-0	Benzoic Acid	410		U
98-95-3	Nitrobenzene	200		U
78-59-1	Isophorone	200		U
88-75-5	2-Nitrophenol	200		U
105-67-9	2,4-Dimethylphenol	200		U
111-91-1	bis(2-Chloroethoxy)methane	200		U
120-83-2	2,4-Dichlorophenol	200		U
120-82-1	1,2,4-Trichlorobenzene	200		U
91-20-3	Naphthalene	20		U
106-47-8	4-Chloroaniline	200		U
87-68-3	Hexachlorobutadiene	200		U
59-50-7	4-Chloro-3-methylphenol	200		U
91-58-7	2-Chloronaphthalene	200		U
91-57-6	2-Methylnaphthalene	20		U
77-47-4	Hexachlorocyclopentadiene	200		U
88-06-2	2,4,6-Trichlorophenol	200		U
95-95-4	2,4,5-Trichlorophenol	41		U

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#: SS1	
Lab Name: EMSL Analytical Inc.	Project: Bronx River Art Center
EMSL Sample ID: 010703757-0001	Sample Matrix: Soils
Lab File ID: A08042.D	Sampling Date: 8/20/07
Instrument ID: SVOA MSD-A	Date Extracted: 8/22/07
Analyst: EAA	Analysis Date: 8/23/07 01:48:00 PM
GC Column: RXI-5MS (0.25 mm)	Sample wt/vol: 30.08 G
Level (low/med): LOW	Dilution Factor: 1
% Moisture: 18	Conc. Extract Volume: 1000 (uL)
PH:	Injection Volume: 1 (ul)
GPC Cleanup(Y/N): N	Extraction Type: 3550B
Method: SW846 8270BNA	

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
88-74-4	2-Nitroaniline	200		U
131-11-3	Dimethylphthalate	200		U
208-96-8	Acenaphthylene	20		U
606-20-2	2,6-Dinitrotoluene	200		U
99-09-2	3-Nitroaniline	200		U
83-32-9	Acenaphthene	20		U
51-28-5	2,4-Dinitrophenol	200		U
100-02-7	4-Nitrophenol	41		U
132-64-9	Dibenzofuran	200		U
121-14-2	2,4-Dinitrotoluene	200		U
84-66-2	Diethylphthalate	200		U
86-73-7	Fluorene	20		U
7005-72-3	4-Chlorophenyl-phenylether	200		U
100-01-6	4-Nitroaniline	200		U
534-52-1	4,6-Dinitro-2-methylphenol	200		U
86-30-6	n-Nitrosodiphenylamine	200		U
122-66-7	1,2-Diphenylhydrazine (as azobenzene)	200		U
101-55-3	4-Bromophenyl-phenylether	200		U
118-74-1	Hexachlorobenzene	200		U
87-86-5	Pentachlorophenol	200		U
85-01-08	Phenanthrene	20	36	
120-12-7	Anthracene	20		U
86-74-8	Carbazole	200		U
84-74-2	Di-n-butylphthalate	200	61	JB
206-44-0	Fluoranthene	20	94	
92-87-5	Benzidine	200		U
129-00-0	Pyrene	20	98	
85-68-7	Butylbenzylphthalate	200	130	J
56-55-3	Benzo[a]anthracene	20	51	
91-94-1	3,3'-Dichlorobenzidine	200		U

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#: SS1	
Lab Name:	EMSL Analytical Inc.
EMSL Sample ID:	010703757-0001
Project:	Bronx River Art Center
Lab File ID:	A08042.D
Sample Matrix:	Soils
Instrument ID:	SVOA MSD-A
Sampling Date:	8/20/07
Analyst:	EAA
Date Extracted:	8/22/07
GC Column:	RXI-5MS (0.25 mm)
Analysis Date:	8/23/07 01:48:00 PM
Level (low/med):	LOW
Sample wt/vol:	30.08 G
% Moisture:	18
Dilution Factor:	1
PH:	
Conc. Extract Volume:	1000 (uL)
GPC Cleanup(Y/N):	N
Injection Volume:	1 (ul)
Method:	SW846 8270BNA
Extraction Type:	3550B

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
218-01-9	Chrysene	20	54	
117-81-7	bis(2-Ethylhexyl)phthalate	200	150	J
117-84-0	Di-n-octylphthalate	200		U
205-99-2	Benzo[b]fluoranthene	20	79	
207-08-9	Benzo[k]fluoranthene	20	45	
50-32-8	Benzo[a]pyrene	20	75	
193-39-5	Indeno[1,2,3-cd]pyrene	20	14	J
53-70-3	Dibenz[a,h]anthracene	13	12	J
191-24-2	Benzo[g,h,i]perylene	20	43	

Qualifier Definitions

U = Undetected
 B = Compound detected in method blank
 E = Estimated value
 J = Estimated concentration.
 D = Dilution

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: EMSL ANALYTICAL		Customer Sample#: SS2
EMSL Sample ID: 010703757-0002	Project: Bronx River Art Center	
Lab File ID: V11717.D	Sample Matrix: Soils	
Instrument ID: VOA MSD-V	Sampling Date: 8/20/07	
Analyst: AF	Analysis Date: 8/22/07 03:01:00 PM	
GC Column: RTX-502.2 (0.25 mm)	Level (low/med): LOW	
Sample wt/vol: 5 G	Nominal Amount: 5 G	
Dilution Factor: 1	Method: SW846 8260B	
Sample Container: Jar (SW-846 5035)	Moisture(%) 13	
Heated Purge (Y/N): Y		

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
75-71-8	Dichlorodifluoromethane	1.1		U
74-87-3	Chloromethane	1.1		U
75-01-4	Vinyl chloride	1.1		U
74-83-9	Bromomethane	1.1		U
75-00-3	Chloroethane	1.1		U
75-69-4	Trichlorofluoromethane	1.1		U
107-02-8	Acrolein	57		U
76-13-1	Freon 113(1,1,2-Trichlorotrifluoroethane)	1.1		U
75-35-4	1,1-Dichloroethene	1.1		U
67-64-1	Acetone	11	46	B
75-15-0	Carbon disulfide	1.1		U
75-09-2	Methylene chloride	1.1	6.1	B
75-65-0	tert-Butyl Alcohol	11		U
156-60-5	trans-1,2-Dichloroethene	1.1		U
1634-04-4	Methyl-tert butyl ether	1.1		U
107-13-1	Acrylonitrile	1.1		U
75-34-3	1,1-Dichloroethane	1.1		U
594-20-7	2,2-Dichloropropane	1.1		U
156-59-2	cis-1,2-Dichloroethene	1.1		U
78-93-3	2-Butanone	2.3		U
74-97-1	Bromochloromethane	1.1		U
67-66-3	Chloroform	1.1		U
71-55-6	1,1,1-Trichloroethane	1.1		U
56-23-1	Carbon tetrachloride	1.1		U
563-58-6	1,1-Dichloropropene	1.1		U
71-43-2	Benzene	0.57		U
107-06-2	1,2-Dichloroethane	1.1		U
79-01-6	Trichloroethene	1.1		U
78-87-1	1,2-Dichloropropane	1.1		U
74-95-3	Dibromomethane	1.1		U
75-27-4	Bromodichloromethane	1.1		U

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#: SS2	
Lab Name:	EMSL ANALYTICAL
EMSL Sample ID:	010703757-0002
Lab File ID:	V11717.D
Instrument ID:	VOA MSD-V
Analyst:	AF
GC Column:	RTX-502.2 (0.25 mm)
Sample wt/vol:	5 G
Dilution Factor:	1
Sample Container:	Jar (SW-846 5035)
Heated Purge (Y/N):	Y
Project:	Bronx River Art Center
Sample Matrix:	Soils
Sampling Date:	8/20/07
Analysis Date:	8/22/07 03:01:00 PM
Level (low/med):	LOW
Nominal Amount:	5 G
Method:	SW846 8260B
Moisture(%)	13

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
110-75-8	2-Chloroethyl vinyl ether	23		U
10061-01-5	cis-1,3-Dichloropropene	1.1		U
108-10-1	4-Methyl-2-pentanone	11		U
108-88-3	Toluene	1.1		U
10061-02-6	trans-1,3-Dichloropropene	1.1		U
79-00-1	1,1,2-Trichloroethane	1.1		U
127-18-4	Tetrachloroethene	1.1		U
142-28-9	1,3-Dichloropropane	1.1		U
591-78-6	2-Hexanone	11		U
124-48-1	Dibromochloromethane	1.1		U
106-93-4	1,2-Dibromoethane	1.1		U
108-90-7	Chlorobenzene	1.1		U
630-20-6	1,1,1,2-Tetrachloroethane	1.1		U
100-41-4	Ethylbenzene	1.1		U
108-38-3	Xylene (para & meta)	1.1		U
95-47-6	Xylene (Ortho)	1.1		U
100-42-1	Styrene	1.1		U
75-25-2	Bromoform	1.1		U
98-82-8	Isopropylbenzene	1.1		U
108-86-1	Bromobenzene	1.1		U
79-34-1	1,1,2,2-Tetrachloroethane	1.1		U
96-18-4	1,2,3-Trichloropropane	1.1		U
103-65-1	n-Propylbenzene	1.1		U
110-57-6	trans-1,4-Dichloro-2-butene	2.3		U
95-49-8	2-Chlorotoluene	1.1		U
106-43-4	4-Chlorotoluene	1.1		U
108-67-8	1,3,5-Trimethylbenzene	1.1		U
98-06-6	tert-Butylbenzene	1.1		U
95-63-6	1,2,4-Trimethylbenzene	1.1		U
135-98-8	sec-Butylbenzene	1.1		U
541-73-1	1,3-Dichlorobenzene	1.1		U

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SS2		
Lab Name:	EMSL ANALYTICAL	Project:	Bronx River Art Center	
EMSL Sample ID:	010703757-0002	Sample Matrix:	Soils	
Lab File ID:	V11717.D	Sampling Date:	8/20/07	
Instrument ID:	VOA MSD-V	Analysis Date:	8/22/07 03:01:00 PM	
Analyst:	AF	Level (low/med):	LOW	
GC Column:	RTX-502.2 (0.25 mm)	Nominal Amount:	5 G	
Sample wt/vol:	5 G	Method:	SW846 8260B	
Dilution Factor:	1	Moisture(%)	13	
Sample Container:	Jar (SW-846 5035)			
Heated Purge (Y/N):	Y			

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
99-87-6	4-Isopropyltoluene	1.1		U
106-46-7	1,4-Dichlorobenzene	1.1		U
95-50-1	1,2-Dichlorobenzene	1.1		U
104-51-8	n-Butylbenzene	1.1		U
96-12-8	1,2-Dibromo-3-chloropropane	1.1		U
120-82-1	1,2,4-Trichlorobenzene	1.1		U
87-68-3	Hexachlorobutadiene	1.1		U
91-20-3	Naphthalene	1.1		U
87-61-6	1,2,3-Trichlorobenzene	1.1		U

Qualifier Definitions
 U = Undetected
 B = Compound detected in method blank
 E = Estimated value
 J = Estimated concentration.
 D = Dilution

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SS2	
Lab Name:	EMSL Analytical Inc.	Project:	Bronx River Art Center
EMSL Sample ID:	010703757-0002	Sample Matrix:	Soils
Lab File ID:	A08057.D	Sampling Date:	8/20/07
Instrument ID:	SVOA MSD-A	Date Extracted:	8/22/07
Analyst:	EAA	Analysis Date	8/23/07 09:16:00 PM
GC Column:	RXI-5MS (0.25 mm)	Sample wt/vol:	30.01 G
Level (low/med):	LOW	Dilution Factor:	1
% Moisture:	13	Conc. Extract Volume:	1000 (uL)
PH:		Injection Volume:	1 (ul)
GPC Cleanup(Y/N):	N	Extraction Type:	3550B
Method:	SW846 8270BNA		

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
62-75-9	N-nitrosodimethylamine	190		U
108-95-2	Phenol	38		U
100-51-6	Benzyl alcohol	190		U
111-44-4	bis(2-Chloroethyl)ether	190		U
95-57-8	2-Chlorophenol	190		U
541-73-1	1,3-Dichlorobenzene	190		U
106-46-7	1,4-Dichlorobenzene	190		U
95-50-1	1,2-Dichlorobenzene	190		U
95-48-7	2-Methylphenol	38		U
108-60-1	bis(2-chloroisopropyl)ether	190		U
1319-77-3	3+4-Methylphenol	190		U
621-64-7	N-Nitroso-Di-n-propylamine	190		U
67-72-1	Hexachloroethane	190		U
65-85-0	Benzoic Acid	380	270	J
98-95-3	Nitrobenzene	190		U
78-59-1	Isophorone	190		U
88-75-5	2-Nitrophenol	190		U
105-67-9	2,4-Dimethylphenol	190		U
111-91-1	bis(2-Chloroethoxy)methane	190		U
120-83-2	2,4-Dichlorophenol	190		U
120-82-1	1,2,4-Trichlorobenzene	190		U
91-20-3	Naphthalene	19		U
106-47-8	4-Chloroaniline	190		U
87-68-3	Hexachlorobutadiene	190		U
59-50-7	4-Chloro-3-methylphenol	190		U
91-58-7	2-Chloronaphthalene	190		U
91-57-6	2-Methylnaphthalene	19		U
77-47-4	Hexachlorocyclopentadiene	190		U
88-06-2	2,4,6-Trichlorophenol	190		U
95-95-4	2,4,5-Trichlorophenol	38		U

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SS2	
Lab Name:	EMSL Analytical Inc.	Project:	Bronx River Art Center
EMSL Sample ID:	010703757-0002	Sample Matrix:	Soils
Lab File ID:	A08057.D	Sampling Date:	8/20/07
Instrument ID:	SVOA MSD-A	Date Extracted:	8/22/07
Analyst:	EAA	Analysis Date	8/23/07 09:16:00 PM
GC Column:	RXI-5MS (0.25 mm)	Sample wt/vol:	30.01 G
Level (low/med):	LOW	Dilution Factor:	1
% Moisture:	13	Conc. Extract Volume:	1000 (uL)
PH:		Injection Volume:	1 (ul)
GPC Cleanup(Y/N):	N	Extraction Type:	3550B
Method:	SW846 8270BNA		

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
88-74-4	2-Nitroaniline	190		U
131-11-3	Dimethylphthalate	190		U
208-96-8	Acenaphthylene	19	53	
606-20-2	2,6-Dinitrotoluene	190		U
99-09-2	3-Nitroaniline	190		U
83-32-9	Acenaphthene	19	13	J
51-28-5	2,4-Dinitrophenol	190		U
100-02-7	4-Nitrophenol	38		U
132-64-9	Dibenzofuran	190		U
121-14-2	2,4-Dinitrotoluene	190		U
84-66-2	Diethylphthalate	190		U
86-73-7	Fluorene	19		U
7005-72-3	4-Chlorophenyl-phenylether	190		U
100-01-6	4-Nitroaniline	190		U
534-52-1	4,6-Dinitro-2-methylphenol	190		U
86-30-6	n-Nitrosodiphenylamine	190		U
122-66-7	1,2-Diphenylhydrazine (as azobenzene)	190		U
101-55-3	4-Bromophenyl-phenylether	190		U
118-74-1	Hexachlorobenzene	190		U
87-86-5	Pentachlorophenol	190		U
85-01-08	Phenanthrene	19	150	
120-12-7	Anthracene	19	48	
86-74-8	Carbazole	190	29	J
84-74-2	Di-n-butylphthalate	190	75	JB
206-44-0	Fluoranthene	19	340	
92-87-5	Benzidine	190		U
129-00-0	Pyrene	19	340	
85-68-7	Butylbenzylphthalate	190	180	J
56-55-3	Benzo[a]anthracene	19	190	
91-94-1	3,3'-Dichlorobenzidine	190		U

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#: SS2	
Lab Name: EMSL Analytical Inc.	
EMSL Sample ID: 010703757-0002	Project: Bronx River Art Center
Lab File ID: A08057.D	Sample Matrix: Soils
Instrument ID: SVOA MSD-A	Sampling Date: 8/20/07
Analyst: EAA	Date Extracted: 8/22/07
GC Column: RXI-5MS (0.25 mm)	Analysis Date: 8/23/07 09:16:00 PM
Level (low/med): LOW	Sample wt/vol: 30.01 G
% Moisture: 13	Dilution Factor: 1
PH:	Conc. Extract Volume: 1000 (uL)
GPC Cleanup(Y/N): N	Injection Volume: 1 (uL)
Method: SW846 8270BNA	Extraction Type: 3550B

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
218-01-9	Chrysene	19	190	
117-81-7	bis(2-Ethylhexyl)phthalate	190	200	
117-84-0	Di-n-octylphthalate	190		U
205-99-2	Benzo[b]fluoranthene	19	160	
207-08-9	Benzo[k]fluoranthene	19	150	
50-32-8	Benzo[a]pyrene	19	190	
193-39-5	Indeno[1,2,3-cd]pyrene	19	150	
53-70-3	Dibenz[a,h]anthracene	12	62	
191-24-2	Benzo[g,h,i]perylene	19	220	

Qualifier Definitions

U = Undetected
 B = Compound detected in method blank
 E = Estimated value
 J = Estimated concentration.
 D = Dilution

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SS3	
Lab Name:	EMSL ANALYTICAL	Project:	Bronx River Art Center
EMSL Sample ID:	010703757-0003	Sample Matrix:	Soils
Lab File ID:	T0930.D	Sampling Date:	8/20/2007
Instrument ID:	VOA MSD-T	Analysis Date	8/21/2007 17:48:00
Analyst:	AF	Level (low/med):	MED
GC Column:	RTX-502.2 (0.25 mm)	Nominal Amount:	100 µL
Sample wt/vol:	10 G	Aliquot Analyzed:	100 (ul)
Extract Vol.	10000 (uL)	Method:	SW846 8260B
Dilution Factor:	1	Moisture(%)	21
Sample Container:	Jar (SW-846 5035)		
Heated Purge (Y/N):	N		

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
75-71-8	Dichlorodifluoromethane	63		U
74-87-3	Chloromethane	130		U
75-01-4	Vinyl chloride	63		U
74-83-9	Bromomethane	320		U
75-00-3	Chloroethane	63		U
75-69-4	Trichlorofluoromethane	63		U
107-02-8	Acrolein	3200		U
76-13-1	Freon 113(1,1,2-Trichlorotrifluoroethan	63		U
75-35-4	1,1-Dichloroethene	63		U
67-64-1	Acetone	630	530	J
75-15-0	Carbon disulfide	63		U
75-09-2	Methylene chloride	63		U
75-65-0	tert-Butyl Alcohol	630		U
156-60-5	trans-1,2-Dichloroethene	63		U
1634-04-4	Methyl-tert butyl ether	63		U
107-13-1	Acrylonitrile	63		U
75-34-3	1,1-Dichloroethane	63		U
594-20-7	2,2-Dichloropropane	63		U
156-59-2	cis-1,2-Dichloroethene	63		U
78-93-3	2-Butanone	130		U
74-97-1	Bromochloromethane	63		U
67-66-3	Chloroform	63		U
71-55-6	1,1,1-Trichloroethane	63		U
56-23-1	Carbon tetrachloride	63		U
563-58-6	1,1-Dichloropropene	63		U
71-43-2	Benzene	32		U
107-06-2	1,2-Dichloroethane	63		U
79-01-6	Trichloroethene	63		U
78-87-1	1,2-Dichloropropane	63		U
74-95-3	Dibromomethane	63		U
75-27-4	Bromodichloromethane	63		U
110-75-8	2-Chloroethyl vinyl ether	1300		U

Printed: 08/22/07 02:59:25 PM

FORM1--VOA

SampleList: 082107TS

ERM: V:\VOAERMS\8260ERMS\8260.erm

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SS3	
Lab Name:	EMSL ANALYTICAL	Project:	Bronx River Art Center
EMSL Sample ID:	010703757-0003	Sample Matrix:	Soils
Lab File ID:	T0930.D	Sampling Date:	8/20/2007
Instrument ID:	VOA MSD-T	Analysis Date:	8/21/2007 17:48:00
Analyst:	AF	Level (low/med):	MED
GC Column:	RTX-502.2 (0.25 mm)	Nominal Amount:	100 µL
Sample wt/vol:	10 G	Aliquot Analyzed:	100 (ul)
Extract Vol.	10000 (uL)	Method:	SW846 8260B
Dilution Factor:	1	Moisture(%)	21
Sample Container:	Jar (SW-846 5035)		
Heated Purge (Y/N):	N		

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
10061-01-5	cis-1,3-Dichloropropene	63		U
108-10-1	4-Methyl-2-pentanone	630		U
108-88-3	Toluene	63		U
10061-02-6	trans-1,3-Dichloropropene	63		U
79-00-1	1,1,2-Trichloroethane	63		U
127-18-4	Tetrachloroethene	63		U
142-28-9	1,3-Dichloropropane	63		U
591-78-6	2-Hexanone	630		U
124-48-1	Dibromochloromethane	63		U
106-93-4	1,2-Dibromoethane	63		U
108-90-7	Chlorobenzene	63		U
630-20-6	1,1,1,2-Tetrachloroethane	63		U
100-41-4	Ethylbenzene	63		U
108-38-3	Xylene (para & meta)	63		U
95-47-6	Xylene (Ortho)	63		U
100-42-1	Styrene	63		U
75-25-2	Bromoform	63		U
98-82-8	Isopropylbenzene	63		U
108-86-1	Bromobenzene	63		U
79-34-1	1,1,2,2-Tetrachloroethane	63		U
96-18-4	1,2,3-Trichloropropane	63		U
103-65-1	n-Propylbenzene	63	71	
110-57-6	trans-1,4-Dichloro-2-butene	130		U
95-49-8	2-Chlorotoluene	63		U
106-43-4	4-Chlorotoluene	63		U
108-67-8	1,3,5-Trimethylbenzene	63		U
98-06-6	tert-Butylbenzene	63		U
95-63-6	1,2,4-Trimethylbenzene	63		U
135-98-8	sec-Butylbenzene	63	65	
541-73-1	1,3-Dichlorobenzene	63		U
99-87-6	4-Isopropyltoluene	63		U
106-46-7	1,4-Dichlorobenzene	63		U

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#: SS3	
Lab Name: EMSL ANALYTICAL	
EMSL Sample ID: 010703757-0003	Project: Bronx River Art Center
Lab File ID: T0930.D	Sample Matrix: Soils
Instrument ID: VOA MSD-T	Sampling Date: 8/20/2007
Analyst: AF	Analysis Date: 8/21/2007 17:48:00
GC Column: RTX-502.2 (0.25 mm)	Level (low/med): MED
Sample wt/vol: 10 G	Nominal Amount: 100 µL
Extract Vol. 10000 (uL)	Aliquot Analyzed: 100 (ul)
Dilution Factor: 1	Method: SW846 8260B
Sample Container: Jar (SW-846 5035)	Moisture(%): 21
Heated Purge (Y/N): N	

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
95-50-1	1,2-Dichlorobenzene	63		U
104-51-8	n-Butylbenzene	63	63	
96-12-8	1,2-Dibromo-3-chloropropane	63		U
120-82-1	1,2,4-Trichlorobenzene	63		U
87-68-3	Hexachlorobutadiene	63		U
91-20-3	Naphthalene	63		U
87-61-6	1,2,3-Trichlorobenzene	63		U

Qualifier Definitions
 U = Undetected
 B = Compound detected in method blank
 E = Estimated value
 J = Estimated concentration.
 D = Dilution

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#: SS3	
Lab Name: EMSL Analytical Inc.	
EMSL Sample ID: 010703757-0003	Project: Bronx River Art Center
Lab File ID: A08026.D	Sample Matrix: Soils
Instrument ID: SVOA MSD-A	Sampling Date: 8/20/07
Analyst: EAA	Date Extracted: 8/22/07
GC Column: RXI-5MS (0.25 mm)	Analysis Date: 8/22/07 05:44:00 PM
Level (low/med): LOW	Sample wt/vol: 30.11 G
% Moisture: 21	Dilution Factor: 1
PH:	Conc. Extract Volume: 1000 (uL)
GPC Cleanup(Y/N): N	Injection Volume: 1 (ul)
Method: SW846 8270BNA	Extraction Type: 3550B

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
62-75-9	N-nitrosodimethylamine	210		U
108-95-2	Phenol	42		U
100-51-6	Benzyl alcohol	210		U
111-44-4	bis(2-Chloroethyl)ether	210		U
95-57-8	2-Chlorophenol	210		U
541-73-1	1,3-Dichlorobenzene	210		U
106-46-7	1,4-Dichlorobenzene	210		U
95-50-1	1,2-Dichlorobenzene	210		U
95-48-7	2-Methylphenol	42		U
108-60-1	bis(2-chloroisopropyl)ether	210		U
1319-77-3	3+4-Methylphenol	210		U
621-64-7	N-Nitroso-Di-n-propylamine	210		U
67-72-1	Hexachloroethane	210		U
65-85-0	Benzoic Acid	420		U
98-95-3	Nitrobenzene	210		U
78-59-1	Isophorone	210		U
88-75-5	2-Nitrophenol	210		U
105-67-9	2,4-Dimethylphenol	210		U
111-91-1	bis(2-Chloroethoxy)methane	210		U
120-83-2	2,4-Dichlorophenol	210		U
120-82-1	1,2,4-Trichlorobenzene	210		U
91-20-3	Naphthalene	21		U
106-47-8	4-Chloroaniline	210		U
87-68-3	Hexachlorobutadiene	210		U
59-50-7	4-Chloro-3-methylphenol	210		U
91-58-7	2-Chloronaphthalene	210		U
91-57-6	2-Methylnaphthalene	21		U
77-47-4	Hexachlorocyclopentadiene	210		U
88-06-2	2,4,6-Trichlorophenol	210		U
95-95-4	2,4,5-Trichlorophenol	42		U

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#: SS3	
Lab Name: EMSL Analytical Inc.	
EMSL Sample ID: 010703757-0003	Project: Bronx River Art Center
Lab File ID: A08026.D	Sample Matrix: Soils
Instrument ID: SVOA MSD-A	Sampling Date: 8/20/07
Analyst: EAA	Date Extracted: 8/22/07
GC Column: RXI-5MS (0.25 mm)	Analysis Date: 8/22/07 05:44:00 PM
Level (low/med): LOW	Sample wt/vol: 30.11 G
% Moisture: 21	Dilution Factor: 1
PH:	Conc. Extract Volume: 1000 (uL)
GPC Cleanup(Y/N): N	Injection Volume: 1 (ul)
Method: SW846 8270BNA	Extraction Type: 3550B

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
88-74-4	2-Nitroaniline	210		U
131-11-3	Dimethylphthalate	210		U
208-96-8	Acenaphthylene	21		U
606-20-2	2,6-Dinitrotoluene	210		U
99-09-2	3-Nitroaniline	210		U
83-32-9	Acenaphthene	21	240	
51-28-5	2,4-Dinitrophenol	210		U
100-02-7	4-Nitrophenol	42		U
132-64-9	Dibenzofuran	210	170	J
121-14-2	2,4-Dinitrotoluene	210		U
84-66-2	Diethylphthalate	210		U
86-73-7	Fluorene	21	470	
7005-72-3	4-Chlorophenyl-phenylether	210		U
100-01-6	4-Nitroaniline	210		U
534-52-1	4,6-Dinitro-2-methylphenol	210		U
86-30-6	n-Nitrosodiphenylamine	210		U
122-66-7	1,2-Diphenylhydrazine (as azobenzene)	210		U
101-55-3	4-Bromophenyl-phenylether	210		U
118-74-1	Hexachlorobenzene	210		U
87-86-5	Pentachlorophenol	210		U
85-01-08	Phenanthrene	21	870	
120-12-7	Anthracene	21	120	
86-74-8	Carbazole	210		U
84-74-2	Di-n-butylphthalate	210		U
206-44-0	Fluoranthene	21	53	
92-87-5	Benzidine	210		U
129-00-0	Pyrene	21	140	
85-68-7	Butylbenzylphthalate	210		U
56-55-3	Benzo[a]anthracene	21	15	J
91-94-1	3,3'-Dichlorobenzidine	210		U

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SS3		
Lab Name:	EMSL Analytical Inc.			
EMSL Sample ID:	010703757-0003	Project:	Bronx River Art Center	
Lab File ID:	A08026.D	Sample Matrix:	Soils	
Instrument ID:	SVOA MSD-A	Sampling Date:	8/20/07	
Analyst:	EAA	Date Extracted:	8/22/07	
GC Column:	RXI-5MS (0.25 mm)	Analysis Date	8/22/07 05:44:00 PM	
Level (low/med):	LOW	Sample wt/vol:	30.11 G	
% Moisture:	21	Dilution Factor:	1	
PH:		Conc. Extract Volume:	1000 (uL)	
GPC Cleanup(Y/N):	N	Injection Volume:	1 (ul)	
Method:	SW846 8270BNA	Extraction Type:	3550B	

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
218-01-9	Chrysene	21	34	
117-81-7	bis(2-Ethylhexyl)phthalate	210	48	J
117-84-0	Di-n-octylphthalate	210		U
205-99-2	Benzo[b]fluoranthene	21		U
207-08-9	Benzo[k]fluoranthene	21		U
50-32-8	Benzo[a]pyrene	21	810	
193-39-5	Indeno[1,2,3-cd]pyrene	21		U
53-70-3	Dibenz[a,h]anthracene	13		U
191-24-2	Benzo[g,h,i]perylene	21		U

Qualifier Definitions
 U = Undetected
 B = Compound detected in method blank
 E = Estimated value
 J = Estimated concentration.
 D = Dilution

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#: SS4	
Lab Name:	EMSL ANALYTICAL
EMSL Sample ID:	010703757-0004
Lab File ID:	V11705.D
Instrument ID:	VOA MSD-V
Analyst:	WRF
GC Column:	RTX-502.2 (0.25 mm)
Sample wt/vol:	5 G
Dilution Factor:	1
Sample Container:	Jar (SW-846 5035)
Heated Purge (Y/N):	Y
Project:	Bronx River Art Center
Sample Matrix:	Soils
Sampling Date:	8/20/2007
Analysis Date:	8/21/2007 19:28:00
Level (low/med):	LOW
Nominal Amount:	5 G
Method:	SW846 8260B
Moisture(%)	18

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
75-71-8	Dichlorodifluoromethane	1.2		U
74-87-3	Chloromethane	1.2		U
75-01-4	Vinyl chloride	1.2		U
74-83-9	Bromomethane	1.2		U
75-00-3	Chloroethane	1.2		U
75-69-4	Trichlorofluoromethane	1.2		U
107-02-8	Acrolein	61		U
76-13-1	Freon 113(1,1,2-Trichlorotrifluoroethan	1.2		U
75-35-4	1,1-Dichloroethene	1.2		U
67-64-1	Acetone	12	50	
75-15-0	Carbon disulfide	1.2		U
75-09-2	Methylene chloride	1.2	7.7	B
75-65-0	tert-Butyl Alcohol	12		U
156-60-5	trans-1,2-Dichloroethene	1.2		U
1634-04-4	Methyl-tert butyl ether	1.2		U
107-13-1	Acrylonitrile	1.2		U
75-34-3	1,1-Dichloroethane	1.2		U
594-20-7	2,2-Dichloropropane	1.2		U
156-59-2	cis-1,2-Dichloroethene	1.2		U
78-93-3	2-Butanone	2.4		U
74-97-1	Bromochloromethane	1.2		U
67-66-3	Chloroform	1.2		U
71-55-6	1,1,1-Trichloroethane	1.2		U
56-23-1	Carbon tetrachloride	1.2		U
563-58-6	1,1-Dichloropropene	1.2		U
71-43-2	Benzene	0.61		U
107-06-2	1,2-Dichloroethane	1.2		U
79-01-6	Trichloroethene	1.2		U
78-87-1	1,2-Dichloropropane	1.2		U
74-95-3	Dibromomethane	1.2		U
75-27-4	Bromodichloromethane	1.2		U
110-75-8	2-Chloroethyl vinyl ether	24		U
10061-01-5	cis-1,3-Dichloropropene	1.2		U

Printed: 08/22/07 04:50:01 PM

FORM1--VOA

SampleList: 082107VA

ERM: V:\VOA\ERMS\8260\ERMS\8260.erm

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SS4	
Lab Name:	EMSL ANALYTICAL	Project:	Bronx River Art Center
EMSL Sample ID:	010703757-0004	Sample Matrix:	Soils
Lab File ID:	V11705.D	Sampling Date:	8/20/2007
Instrument ID:	VOA MSD-V	Analysis Date:	8/21/2007 19:28:00
Analyst:	WRF	Level (low/med):	LOW
GC Column:	RTX-502.2 (0.25 mm)	Nominal Amount:	5 G
Sample wt/vol:	5 G	Method:	SW846 8260B
Dilution Factor:	1	Moisture(%)	18
Sample Container:	Jar (SW-846 5035)		
Heated Purge (Y/N):	Y		

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
108-10-1	4-Methyl-2-pentanone	12		U
108-88-3	Toluene	1.2		U
10061-02-6	trans-1,3-Dichloropropene	1.2		U
79-00-1	1,1,2-Trichloroethane	1.2		U
127-18-4	Tetrachloroethene	1.2		U
142-28-9	1,3-Dichloropropane	1.2		U
591-78-6	2-Hexanone	12		U
124-48-1	Dibromochloromethane	1.2		U
106-93-4	1,2-Dibromoethane	1.2		U
108-90-7	Chlorobenzene	1.2		U
630-20-6	1,1,1,2-Tetrachloroethane	1.2		U
100-41-4	Ethylbenzene	1.2		U
108-38-3	Xylene (para & meta)	1.2		U
95-47-6	Xylene (Ortho)	1.2		U
100-42-1	Styrene	1.2		U
75-25-2	Bromoform	1.2		U
98-82-8	Isopropylbenzene	1.2	14	
108-86-1	Bromobenzene	1.2		U
79-34-1	1,1,2,2-Tetrachloroethane	1.2		U
96-18-4	1,2,3-Trichloropropane	1.2		U
103-65-1	n-Propylbenzene	1.2	41	
110-57-6	trans-1,4-Dichloro-2-butene	2.4		U
95-49-8	2-Chlorotoluene	1.2		U
106-43-4	4-Chlorotoluene	1.2		U
108-67-8	1,3,5-Trimethylbenzene	1.2		U
98-06-6	tert-Butylbenzene	1.2		U
95-63-6	1,2,4-Trimethylbenzene	1.2		U
135-98-8	sec-Butylbenzene	1.2	40	
541-73-1	1,3-Dichlorobenzene	1.2		U
99-87-6	4-Isopropyltoluene	1.2		U
106-46-7	1,4-Dichlorobenzene	1.2		U
95-50-1	1,2-Dichlorobenzene	1.2		U
104-51-8	n-Butylbenzene	1.2	58	

Printed: 08/22/07 04:50:01 PM

FORM1--VOA

2 of 3

SampleList: 082107VA

ERM: V:\VOA\ERMS\8260\ERMS\8260.erm

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SS4		
Lab Name:	EMSL ANALYTICAL			
EMSL Sample ID:	010703757-0004	Project:	Bronx River Art Center	
Lab File ID:	V11705.D	Sample Matrix:	Soils	
Instrument ID:	VOA MSD-V	Sampling Date:	8/20/2007	
Analyst:	WRF	Analysis Date	8/21/2007 19:28:00	
GC Column:	RTX-502.2 (0.25 mm)	Level (low/med):	LOW	
Sample wt/vol:	5 G	Nominal Amount:	5 G	
Dilution Factor:	1	Method:	SW846 8260B	
Sample Container:	Jar (SW-846 5035)	Moisture(%)	18	
Heated Purge (Y/N):	Y			

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
96-12-8	1,2-Dibromo-3-chloropropane	1.2		U
120-82-1	1,2,4-Trichlorobenzene	1.2		U
87-68-3	Hexachlorobutadiene	1.2		U
91-20-3	Naphthalene	1.2	15	
87-61-6	1,2,3-Trichlorobenzene	1.2		U

Qualifier Definitions
 U = Undetected
 B = Compound detected in method blank
 E = Estimated value
 J = Estimated concentration.
 D = Dilution

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#: SS4	
Lab Name:	EMSL Analytical Inc.
EMSL Sample ID:	010703757-0004
Lab File ID:	A08040.D
Instrument ID:	SVOA MSD-A
Analyst:	EAA
GC Column:	RXI-5MS (0.25 mm)
Level (low/med):	LOW
% Moisture:	19
PH:	
GPC Cleanup(Y/N):	N
Method:	SW846 8270BNA
Project:	Bronx River Art Center
Sample Matrix:	Soils
Sampling Date:	8/20/07
Date Extracted:	8/22/07
Analysis Date	8/23/07 12:49:00 PM
Sample wt/vol:	30.1 G
Dilution Factor:	1
Conc. Extract Volume:	1000 (uL)
Injection Volume:	1 (ul)
Extraction Type:	3550B

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
62-75-9	N-nitrosodimethylamine	210		U
108-95-2	Phenol	41		U
100-51-6	Benzyl alcohol	210		U
111-44-4	bis(2-Chloroethyl)ether	210		U
95-57-8	2-Chlorophenol	210		U
541-73-1	1,3-Dichlorobenzene	210		U
106-46-7	1,4-Dichlorobenzene	210		U
95-50-1	1,2-Dichlorobenzene	210		U
95-48-7	2-Methylphenol	41		U
108-60-1	bis(2-chloroisopropyl)ether	210		U
1319-77-3	3+4-Methylphenol	210		U
621-64-7	N-Nitroso-Di-n-propylamine	210		U
67-72-1	Hexachloroethane	210		U
65-85-0	Benzoic Acid	410		U
98-95-3	Nitrobenzene	210		U
78-59-1	Isophorone	210		U
88-75-5	2-Nitrophenol	210		U
105-67-9	2,4-Dimethylphenol	210		U
111-91-1	bis(2-Chloroethoxy)methane	210		U
120-83-2	2,4-Dichlorophenol	210		U
120-82-1	1,2,4-Trichlorobenzene	210		U
91-20-3	Naphthalene	21		U
106-47-8	4-Chloroaniline	210		U
87-68-3	Hexachlorobutadiene	210		U
59-50-7	4-Chloro-3-methylphenol	210		U
91-58-7	2-Chloronaphthalene	210		U
91-57-6	2-Methylnaphthalene	21		U
77-47-4	Hexachlorocyclopentadiene	210		U
88-06-2	2,4,6-Trichlorophenol	210		U
95-95-4	2,4,5-Trichlorophenol	41		U

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#: SS4	
Lab Name: EMSL Analytical Inc.	
EMSL Sample ID: 010703757-0004	Project: Bronx River Art Center
Lab File ID: A08040.D	Sample Matrix: Soils
Instrument ID: SVOA MSD-A	Sampling Date: 8/20/07
Analyst: EAA	Date Extracted: 8/22/07
GC Column: RXI-5MS (0.25 mm)	Analysis Date: 8/23/07 12:49:00 PM
Level (low/med): LOW	Sample wt/vol: 30.1 G
% Moisture: 19	Dilution Factor: 1
PH:	Conc. Extract Volume: 1000 (uL)
GPC Cleanup(Y/N): N	Injection Volume: 1 (ul)
Method: SW846 8270BNA	Extraction Type: 3550B

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
88-74-4	2-Nitroaniline	210		U
131-11-3	Dimethylphthalate	210		U
208-96-8	Acenaphthylene	21		U
606-20-2	2,6-Dinitrotoluene	210		U
99-09-2	3-Nitroaniline	210		U
83-32-9	Acenaphthene	21	170	
51-28-5	2,4-Dinitrophenol	210		U
100-02-7	4-Nitrophenol	41		U
132-64-9	Dibenzofuran	210		U
121-14-2	2,4-Dinitrotoluene	210		U
84-66-2	Diethylphthalate	210		U
86-73-7	Fluorene	21	380	
7005-72-3	4-Chlorophenyl-phenylether	210		U
100-01-6	4-Nitroaniline	210		U
534-52-1	4,6-Dinitro-2-methylphenol	210		U
86-30-6	n-Nitrosodiphenylamine	210		U
122-66-7	1,2-Diphenylhydrazine (as azobenzene)	210		U
101-55-3	4-Bromophenyl-phenylether	210		U
118-74-1	Hexachlorobenzene	210		U
87-86-5	Pentachlorophenol	210		U
85-01-08	Phenanthrene	21	740	
120-12-7	Anthracene	21	73	
86-74-8	Carbazole	210		U
84-74-2	Di-n-butylphthalate	210		U
206-44-0	Fluoranthene	21	28	
92-87-5	Benzidine	210		U
129-00-0	Pyrene	21	110	
85-68-7	Butylbenzylphthalate	210		U
56-55-3	Benzo[a]anthracene	21		U
91-94-1	3,3'-Dichlorobenzidine	210		U

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SS4		
Lab Name:	EMSL Analytical Inc.	Project:	Bronx River Art Center	
EMSL Sample ID:	010703757-0004	Sample Matrix:	Soils	
Lab File ID:	A08040.D	Sampling Date:	8/20/07	
Instrument ID:	SVOA MSD-A	Date Extracted:	8/22/07	
Analyst:	EAA	Analysis Date	8/23/07 12:49:00 PM	
GC Column:	RXI-5MS (0.25 mm)	Sample wt/vol:	30.1 G	
Level (low/med):	LOW	Dilution Factor:	1	
% Moisture:	19	Conc. Extract Volume:	1000 (uL)	
PH:		Injection Volume:	1 (ul)	
GPC Cleanup(Y/N):	N	Extraction Type:	3550B	
Method:	SW846 8270BNA			

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
218-01-9	Chrysene	21		U
117-81-7	bis(2-Ethylhexyl)phthalate	210	39	J
117-84-0	Di-n-octylphthalate	210		U
205-99-2	Benzo[b]fluoranthene	21		U
207-08-9	Benzo[k]fluoranthene	21		U
50-32-8	Benzo[a]pyrene	21		U
193-39-5	Indeno[1,2,3-cd]pyrene	21		U
53-70-3	Dibenz[a,h]anthracene	13		U
191-24-2	Benzo[g,h,i]perylene	21		U

Qualifier Definitions
 U = Undetected
 B = Compound detected in method blank
 E = Estimated value
 J = Estimated concentration.
 D = Dilution

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SS5	
Lab Name:	EMSL ANALYTICAL	Project:	Bronx River Art Center
EMSL Sample ID:	010703757-0005	Sample Matrix:	Soils
Lab File ID:	V11706.D	Sampling Date:	8/20/2007
Instrument ID:	VOA MSD-V	Analysis Date:	8/21/2007 20:12:00
Analyst:	WRF	Level (low/med):	LOW
GC Column:	RTX-502.2 (0.25 mm)	Nominal Amount:	5 G
Sample wt/vol:	5 G	Method:	SW846 8260B
Dilution Factor:	1	Moisture(%)	18
Sample Container:	Jar (SW-846 5035)		
Heated Purge (Y/N):	Y		

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
75-71-8	Dichlorodifluoromethane	1.2		U
74-87-3	Chloromethane	1.2		U
75-01-4	Vinyl chloride	1.2		U
74-83-9	Bromomethane	1.2		U
75-00-3	Chloroethane	1.2		U
75-69-4	Trichlorofluoromethane	1.2		U
107-02-8	Acrolein	61		U
76-13-1	Freon 113(1,1,2-Trichlorotrifluoroethane)	1.2		U
75-35-4	1,1-Dichloroethene	1.2		U
67-64-1	Acetone	12	51	
75-15-0	Carbon disulfide	1.2		U
75-09-2	Methylene chloride	1.2	6.8	B
75-65-0	tert-Butyl Alcohol	12		U
156-60-5	trans-1,2-Dichloroethene	1.2		U
1634-04-4	Methyl-tert butyl ether	1.2		U
107-13-1	Acrylonitrile	1.2		U
75-34-3	1,1-Dichloroethane	1.2		U
594-20-7	2,2-Dichloropropane	1.2		U
156-59-2	cis-1,2-Dichloroethene	1.2		U
78-93-3	2-Butanone	2.4		U
74-97-1	Bromochloromethane	1.2		U
67-66-3	Chloroform	1.2		U
71-55-6	1,1,1-Trichloroethane	1.2		U
56-23-1	Carbon tetrachloride	1.2		U
563-58-6	1,1-Dichloropropene	1.2		U
71-43-2	Benzene	0.61		U
107-06-2	1,2-Dichloroethane	1.2		U
79-01-6	Trichloroethene	1.2		U
78-87-1	1,2-Dichloropropane	1.2		U
74-95-3	Dibromomethane	1.2		U
75-27-4	Bromodichloromethane	1.2		U
110-75-8	2-Chloroethyl vinyl ether	24		U
10061-01-5	cis-1,3-Dichloropropene	1.2		U

Printed: 08/22/07 02:57:11 PM

FORM1--VOA

SampleList: 082107VA

ERM: V:\VOAERMS\8260ERMS\8260.erm

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SS5	
Lab Name:	EMSL ANALYTICAL	Project:	Bronx River Art Center
EMSL Sample ID:	010703757-0005	Sample Matrix:	Soils
Lab File ID:	V11706.D	Sampling Date:	8/20/2007
Instrument ID:	VOA MSD-V	Analysis Date:	8/21/2007 20:12:00
Analyst:	WRF	Level (low/med):	LOW
GC Column:	RTX-502.2 (0.25 mm)	Nominal Amount:	5 G
Sample wt/vol:	5 G	Method:	SW846 8260B
Dilution Factor:	1	Moisture(%)	18
Sample Container:	Jar (SW-846 5035)		
Heated Purge (Y/N):	Y		

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
108-10-1	4-Methyl-2-pentanone	12		U
108-88-3	Toluene	1.2		U
10061-02-6	trans-1,3-Dichloropropene	1.2		U
79-00-1	1,1,2-Trichloroethane	1.2		U
127-18-4	Tetrachloroethene	1.2		U
142-28-9	1,3-Dichloropropane	1.2		U
591-78-6	2-Hexanone	12		U
124-48-1	Dibromochloromethane	1.2		U
106-93-4	1,2-Dibromoethane	1.2		U
108-90-7	Chlorobenzene	1.2		U
630-20-6	1,1,1,2-Tetrachloroethane	1.2		U
100-41-4	Ethylbenzene	1.2		U
108-38-3	Xylene (para & meta)	1.2		U
95-47-6	Xylene (Ortho)	1.2		U
100-42-1	Styrene	1.2		U
75-25-2	Bromoform	1.2		U
98-82-8	Isopropylbenzene	1.2		U
108-86-1	Bromobenzene	1.2		U
79-34-1	1,1,2,2-Tetrachloroethane	1.2		U
96-18-4	1,2,3-Trichloropropane	1.2		U
103-65-1	n-Propylbenzene	1.2		U
110-57-6	trans-1,4-Dichloro-2-butene	2.4		U
95-49-8	2-Chlorotoluene	1.2		U
106-43-4	4-Chlorotoluene	1.2		U
108-67-8	1,3,5-Trimethylbenzene	1.2		U
98-06-6	tert-Butylbenzene	1.2	1.4	
95-63-6	1,2,4-Trimethylbenzene	1.2		U
135-98-8	sec-Butylbenzene	1.2		U
541-73-1	1,3-Dichlorobenzene	1.2		U
99-87-6	4-Isopropyltoluene	1.2		U
106-46-7	1,4-Dichlorobenzene	1.2		U
95-50-1	1,2-Dichlorobenzene	1.2		U
104-51-8	n-Butylbenzene	1.2		U

Printed: 08/22/07 02:57:11 PM

FORM1--VOA

2 of 3

SampleList: 082107VA

ERM: V:\VOA\ERMS\8260\ERMS\8260.erm

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SS5		
Lab Name:	EMSL ANALYTICAL	Project:	Bronx River Art Center	
EMSL Sample ID:	010703757-0005	Sample Matrix:	Soils	
Lab File ID:	V11706.D	Sampling Date:	8/20/2007	
Instrument ID:	VOA MSD-V	Analysis Date:	8/21/2007 20:12:00	
Analyst:	WRF	Level (low/med):	LOW	
GC Column:	RTX-502.2 (0.25 mm)	Nominal Amount:	5 G	
Sample wt/vol:	5 G	Method:	SW846 8260B	
Dilution Factor:	1	Moisture(%)	18	
Sample Container:	Jar (SW-846 5035)			
Heated Purge (Y/N):	Y			

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
96-12-8	1,2-Dibromo-3-chloropropane	1.2		U
120-82-1	1,2,4-Trichlorobenzene	1.2		U
87-68-3	Hexachlorobutadiene	1.2		U
91-20-3	Naphthalene	1.2	3.8	
87-61-6	1,2,3-Trichlorobenzene	1.2		U

Qualifier Definitions
 U = Undetected
 B = Compound detected in method blank
 E = Estimated value
 J = Estimated concentration.
 D = Dilution

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SS5	
Lab Name:	EMSL Analytical Inc.	Project:	Bronx River Art Center
EMSL Sample ID:	010703757-0005	Sample Matrix:	Soils
Lab File ID:	A08041.D	Sampling Date:	8/20/07
Instrument ID:	SVOA MSD-A	Date Extracted:	8/22/07
Analyst:	EAA	Analysis Date	8/23/07 01:19:00 PM
GC Column:	RXI-5MS (0.25 mm)	Sample wt/vol:	30.06 G
Level (low/med):	LOW	Dilution Factor:	1
% Moisture:	18	Conc. Extract Volume:	1000 (uL)
PH:		Injection Volume:	1 (ul)
GPC Cleanup(Y/N):	N	Extraction Type:	3550B
Method:	SW846 8270BNA		

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
62-75-9	N-nitrosodimethylamine	200		U
108-95-2	Phenol	41		U
100-51-6	Benzyl alcohol	200		U
111-44-4	bis(2-Chloroethyl)ether	200		U
95-57-8	2-Chlorophenol	200		U
541-73-1	1,3-Dichlorobenzene	200		U
106-46-7	1,4-Dichlorobenzene	200		U
95-50-1	1,2-Dichlorobenzene	200		U
95-48-7	2-Methylphenol	41		U
108-60-1	bis(2-chloroisopropyl)ether	200		U
1319-77-3	3+4-Methylphenol	200		U
621-64-7	N-Nitroso-Di-n-propylamine	200		U
67-72-1	Hexachloroethane	200		U
65-85-0	Benzoic Acid	410		U
98-95-3	Nitrobenzene	200		U
78-59-1	Isophorone	200		U
88-75-5	2-Nitrophenol	200		U
105-67-9	2,4-Dimethylphenol	200		U
111-91-1	bis(2-Chloroethoxy)methane	200		U
120-83-2	2,4-Dichlorophenol	200		U
120-82-1	1,2,4-Trichlorobenzene	200		U
91-20-3	Naphthalene	20		U
106-47-8	4-Chloroaniline	200		U
87-68-3	Hexachlorobutadiene	200		U
59-50-7	4-Chloro-3-methylphenol	200		U
91-58-7	2-Chloronaphthalene	200		U
91-57-6	2-Methylnaphthalene	20		U
77-47-4	Hexachlorocyclopentadiene	200		U
88-06-2	2,4,6-Trichlorophenol	200		U
95-95-4	2,4,5-Trichlorophenol	41		U

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#: SS5	
Lab Name:	EMSL Analytical Inc.
EMSL Sample ID:	010703757-0005
Lab File ID:	A08041.D
Instrument ID:	SVOA MSD-A
Analyst:	EAA
GC Column:	RXI-5MS (0.25 mm)
Level (low/med):	LOW
% Moisture:	18
PH:	
GPC Cleanup(Y/N):	N
Method:	SW846 8270BNA
Project:	Bronx River Art Center
Sample Matrix:	Soils
Sampling Date:	8/20/07
Date Extracted:	8/22/07
Analysis Date	8/23/07 01:19:00 PM
Sample wt/vol:	30.06 G
Dilution Factor:	1
Conc. Extract Volume:	1000 (uL)
Injection Volume:	1 (ul)
Extraction Type:	3550B

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
88-74-4	2-Nitroaniline	200		U
131-11-3	Dimethylphthalate	200		U
208-96-8	Acenaphthylene	20		U
606-20-2	2,6-Dinitrotoluene	200		U
99-09-2	3-Nitroaniline	200		U
83-32-9	Acenaphthene	20		U
51-28-5	2,4-Dinitrophenol	200		U
100-02-7	4-Nitrophenol	41		U
132-64-9	Dibenzofuran	200		U
121-14-2	2,4-Dinitrotoluene	200		U
84-66-2	Diethylphthalate	200		U
86-73-7	Fluorene	20		U
7005-72-3	4-Chlorophenyl-phenylether	200		U
100-01-6	4-Nitroaniline	200		U
534-52-1	4,6-Dinitro-2-methylphenol	200		U
86-30-6	n-Nitrosodiphenylamine	200		U
122-66-7	1,2-Diphenylhydrazine (as azobenzene)	200		U
101-55-3	4-Bromophenyl-phenylether	200		U
118-74-1	Hexachlorobenzene	200		U
87-86-5	Pentachlorophenol	200		U
85-01-08	Phenanthrene	20	25	
120-12-7	Anthracene	20		U
86-74-8	Carbazole	200		U
84-74-2	Di-n-butylphthalate	200	59	JB
206-44-0	Fluoranthene	20	49	
92-87-5	Benzidine	200		U
129-00-0	Pyrene	20	63	
85-68-7	Butylbenzylphthalate	200		U
56-55-3	Benzo[a]anthracene	20	29	
91-94-1	3,3'-Dichlorobenzidine	200		U

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SS5		
Lab Name:	EMSL Analytical Inc.			
EMSL Sample ID:	010703757-0005	Project:	Bronx River Art Center	
Lab File ID:	A08041.D	Sample Matrix:	Soils	
Instrument ID:	SVOA MSD-A	Sampling Date:	8/20/07	
Analyst:	EAA	Date Extracted:	8/22/07	
GC Column:	RXI-5MS (0.25 mm)	Analysis Date:	8/23/07 01:19:00 PM	
Level (low/med):	LOW	Sample wt/vol:	30.06 G	
% Moisture:	18	Dilution Factor:	1	
PH:		Conc. Extract Volume:	1000 (uL)	
GPC Cleanup(Y/N):	N	Injection Volume:	1 (ul)	
Method:	SW846 8270BNA	Extraction Type:	3550B	

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
218-01-9	Chrysene	20	31	
117-81-7	bis(2-Ethylhexyl)phthalate	200	54	J
117-84-0	Di-n-octylphthalate	200		U
205-99-2	Benzo[b]fluoranthene	20	57	
207-08-9	Benzo[k]fluoranthene	20	26	
50-32-8	Benzo[a]pyrene	20	53	
193-39-5	Indeno[1,2,3-cd]pyrene	20		U
53-70-3	Dibenz[a,h]anthracene	13		U
191-24-2	Benzo[g,h,i]perylene	20	22	

Qualifier Definitions
 U = Undetected
 B = Compound detected in method blank
 E = Estimated value
 J = Estimated concentration.
 D = Dilution

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SS6	
Lab Name:	EMSL ANALYTICAL	Project:	Bronx River Art Center
EMSL Sample ID:	010703757-0006	Sample Matrix:	Soils
Lab File ID:	V11707.D	Sampling Date:	8/20/2007
Instrument ID:	VOA MSD-V	Analysis Date:	8/21/2007 20:56:00
Analyst:	WRF	Level (low/med):	LOW
GC Column:	RTX-502.2 (0.25 mm)	Nominal Amount:	5 G
Sample wt/vol:	5 G	Method:	SW846 8260B
Dilution Factor:	1	Moisture(%)	15
Sample Container:	Jar (SW-846 5035)		
Heated Purge (Y/N):	Y		

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
75-71-8	Dichlorodifluoromethane	1.2		U
74-87-3	Chloromethane	1.2		U
75-01-4	Vinyl chloride	1.2		U
74-83-9	Bromomethane	1.2		U
75-00-3	Chloroethane	1.2		U
75-69-4	Trichlorofluoromethane	1.2		U
107-02-8	Acrolein	59		U
76-13-1	Freon 113(1,1,2-Trichlorotrifluoroethan	1.2		U
75-35-4	1,1-Dichloroethene	1.2		U
67-64-1	Acetone	12	46	
75-15-0	Carbon disulfide	1.2		U
75-09-2	Methylene chloride	1.2	8.6	B
75-65-0	tert-Butyl Alcohol	12		U
156-60-5	trans-1,2-Dichloroethene	1.2		U
1634-04-4	Methyl-tert butyl ether	1.2		U
107-13-1	Acrylonitrile	1.2		U
75-34-3	1,1-Dichloroethane	1.2		U
594-20-7	2,2-Dichloropropane	1.2		U
156-59-2	cis-1,2-Dichloroethene	1.2		U
78-93-3	2-Butanone	2.4		U
74-97-1	Bromochloromethane	1.2		U
67-66-3	Chloroform	1.2		U
71-55-6	1,1,1-Trichloroethane	1.2		U
56-23-1	Carbon tetrachloride	1.2		U
563-58-6	1,1-Dichloropropene	1.2		U
71-43-2	Benzene	0.59		U
107-06-2	1,2-Dichloroethane	1.2		U
79-01-6	Trichloroethene	1.2		U
78-87-1	1,2-Dichloropropane	1.2		U
74-95-3	Dibromomethane	1.2		U
75-27-4	Bromodichloromethane	1.2		U
110-75-8	2-Chloroethyl vinyl ether	24		U
10061-01-5	cis-1,3-Dichloropropene	1.2		U

Printed: 08/22/07 02:57:36 PM

FORM1--VOA

SampleList: 082107VA

ERM: V:\VOAERMS\8260ERMS\8260.erm

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SS6	
Lab Name:	EMSL ANALYTICAL	Project:	Bronx River Art Center
EMSL Sample ID:	010703757-0006	Sample Matrix:	Soils
Lab File ID:	V11707.D	Sampling Date:	8/20/2007
Instrument ID:	VOA MSD-V	Analysis Date:	8/21/2007 20:56:00
Analyst:	WRF	Level (low/med):	LOW
GC Column:	RTX-502.2 (0.25 mm)	Nominal Amount:	5 G
Sample wt/vol:	5 G	Method:	SW846 8260B
Dilution Factor:	1	Moisture(%)	15
Sample Container:	Jar (SW-846 5035)		
Heated Purge (Y/N):	Y		

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
108-10-1	4-Methyl-2-pentanone	12		U
108-88-3	Toluene	1.2		U
10061-02-6	trans-1,3-Dichloropropene	1.2		U
79-00-1	1,1,2-Trichloroethane	1.2		U
127-18-4	Tetrachloroethene	1.2		U
142-28-9	1,3-Dichloropropane	1.2		U
591-78-6	2-Hexanone	12		U
124-48-1	Dibromochloromethane	1.2		U
106-93-4	1,2-Dibromoethane	1.2		U
108-90-7	Chlorobenzene	1.2		U
630-20-6	1,1,1,2-Tetrachloroethane	1.2		U
100-41-4	Ethylbenzene	1.2		U
108-38-3	Xylene (para & meta)	1.2		U
95-47-6	Xylene (Ortho)	1.2		U
100-42-1	Styrene	1.2		U
75-25-2	Bromoform	1.2		U
98-82-8	Isopropylbenzene	1.2		U
108-86-1	Bromobenzene	1.2		U
79-34-1	1,1,2,2-Tetrachloroethane	1.2		U
96-18-4	1,2,3-Trichloropropane	1.2		U
103-65-1	n-Propylbenzene	1.2		U
110-57-6	trans-1,4-Dichloro-2-butene	2.4		U
95-49-8	2-Chlorotoluene	1.2		U
106-43-4	4-Chlorotoluene	1.2		U
108-67-8	1,3,5-Trimethylbenzene	1.2		U
98-06-6	tert-Butylbenzene	1.2		U
95-63-6	1,2,4-Trimethylbenzene	1.2		U
135-98-8	sec-Butylbenzene	1.2		U
541-73-1	1,3-Dichlorobenzene	1.2		U
99-87-6	4-Isopropyltoluene	1.2		U
106-46-7	1,4-Dichlorobenzene	1.2		U
95-50-1	1,2-Dichlorobenzene	1.2		U
104-51-8	n-Butylbenzene	1.2		U

Printed: 08/22/07 02:57:36 PM

FORM1--VOA

SampleList: 082107VA

ERM: V:\VOAERMS\8260ERMS\8260.erm

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SS6			
Lab Name:	EMSL ANALYTICAL	Project:	Bronx River Art Center		
EMSL Sample ID:	010703757-0006	Sample Matrix:	Soils		
Lab File ID:	V11707.D	Sampling Date:	8/20/2007		
Instrument ID:	VOA MSD-V	Analysis Date:	8/21/2007 20:56:00		
Analyst:	WRF	Level (low/med):	LOW		
GC Column:	RTX-502.2 (0.25 mm)	Nominal Amount:	5 G		
Sample wt/vol:	5 G	Method:	SW846 8260B		
Dilution Factor:	1	Moisture(%)	15		
Sample Container:	Jar (SW-846 5035)				
Heated Purge (Y/N):	Y				

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
96-12-8	1,2-Dibromo-3-chloropropane	1.2		U
120-82-1	1,2,4-Trichlorobenzene	1.2		U
87-68-3	Hexachlorobutadiene	1.2		U
91-20-3	Naphthalene	1.2	11	
87-61-6	1,2,3-Trichlorobenzene	1.2		U

Qualifier Definitions
 U = Undetected
 B = Compound detected in method blank
 E = Estimated value
 J = Estimated concentration.
 D = Dilution

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SS6	
Lab Name:	EMSL Analytical Inc.	Project:	Bronx River Art Center
EMSL Sample ID:	010703757-0006	Sample Matrix:	Soils
Lab File ID:	A08059.D	Sampling Date:	8/20/07
Instrument ID:	SVOA MSD-A	Date Extracted:	8/22/07
Analyst:	EAA	Analysis Date	8/23/07 10:16:00 PM
GC Column:	RXI-5MS (0.25 mm)	Sample wt/vol:	30.06 G
Level (low/med):	LOW	Dilution Factor:	1
% Moisture:	15	Conc. Extract Volume:	1000 (uL)
PH:		Injection Volume:	1 (ul)
GPC Cleanup(Y/N):	N	Extraction Type:	3550B
Method:	SW846 8270BNA		

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
62-75-9	N-nitrosodimethylamine	200		U
108-95-2	Phenol	39		U
100-51-6	Benzyl alcohol	200		U
111-44-4	bis(2-Chloroethyl)ether	200		U
95-57-8	2-Chlorophenol	200		U
541-73-1	1,3-Dichlorobenzene	200		U
106-46-7	1,4-Dichlorobenzene	200		U
95-50-1	1,2-Dichlorobenzene	200		U
95-48-7	2-Methylphenol	39		U
108-60-1	bis(2-chloroisopropyl)ether	200		U
1319-77-3	3+4-Methylphenol	200	190	J
621-64-7	N-Nitroso-Di-n-propylamine	200		U
67-72-1	Hexachloroethane	200		U
65-85-0	Benzoic Acid	390	610	
98-95-3	Nitrobenzene	200		U
78-59-1	Isophorone	200		U
88-75-5	2-Nitrophenol	200		U
105-67-9	2,4-Dimethylphenol	200		U
111-91-1	bis(2-Chloroethoxy)methane	200		U
120-83-2	2,4-Dichlorophenol	200		U
120-82-1	1,2,4-Trichlorobenzene	200		U
91-20-3	Naphthalene	20	42	
106-47-8	4-Chloroaniline	200		U
87-68-3	Hexachlorobutadiene	200		U
59-50-7	4-Chloro-3-methylphenol	200		U
91-58-7	2-Chloronaphthalene	200		U
91-57-6	2-Methylnaphthalene	20	66	
77-47-4	Hexachlorocyclopentadiene	200		U
88-06-2	2,4,6-Trichlorophenol	200		U
95-95-4	2,4,5-Trichlorophenol	39		U

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SS6	
Lab Name:	EMSL Analytical Inc.	Project:	Bronx River Art Center
EMSL Sample ID:	010703757-0006	Sample Matrix:	Soils
Lab File ID:	A08059.D	Sampling Date:	8/20/07
Instrument ID:	SVOA MSD-A	Date Extracted:	8/22/07
Analyst:	EAA	Analysis Date	8/23/07 10:16:00 PM
GC Column:	RXI-5MS (0.25 mm)	Sample wt/vol:	30.06 G
Level (low/med):	LOW	Dilution Factor:	1
% Moisture:	15	Conc. Extract Volume:	1000 (uL)
PH:		Injection Volume:	1 (ul)
GPC Cleanup(Y/N):	N	Extraction Type:	3550B
Method:	SW846 8270BNA		

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
88-74-4	2-Nitroaniline	200		U
131-11-3	Dimethylphthalate	200		U
208-96-8	Acenaphthylene	20	330	
606-20-2	2,6-Dinitrotoluene	200		U
99-09-2	3-Nitroaniline	200		U
83-32-9	Acenaphthene	20	97	
51-28-5	2,4-Dinitrophenol	200		U
100-02-7	4-Nitrophenol	39		U
132-64-9	Dibenzofuran	200	54	J
121-14-2	2,4-Dinitrotoluene	200		U
84-66-2	Diethylphthalate	200		U
86-73-7	Fluorene	20	95	
7005-72-3	4-Chlorophenyl-phenylether	200		U
100-01-6	4-Nitroaniline	200		U
534-52-1	4,6-Dinitro-2-methylphenol	200		U
86-30-6	n-Nitrosodiphenylamine	200		U
122-66-7	1,2-Diphenylhydrazine (as azobenzene)	200		U
101-55-3	4-Bromophenyl-phenylether	200		U
118-74-1	Hexachlorobenzene	200		U
87-86-5	Pentachlorophenol	200		U
85-01-08	Phenanthrene	20	1400	
120-12-7	Anthracene	20	560	
86-74-8	Carbazole	200	140	J
84-74-2	Di-n-butylphthalate	200		U
206-44-0	Fluoranthene	20	4300	
92-87-5	Benzidine	200		U
129-00-0	Pyrene	20	3100	
85-68-7	Butylbenzylphthalate	200		U
56-55-3	Benzo[a]anthracene	20	1900	
91-94-1	3,3'-Dichlorobenzidine	200		U

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#: SS6	
Lab Name: EMSL Analytical Inc.	
EMSL Sample ID: 010703757-0006	Project: Bronx River Art Center
Lab File ID: A08059.D	Sample Matrix: Soils
Instrument ID: SVOA MSD-A	Sampling Date: 8/20/07
Analyst: EAA	Date Extracted: 8/22/07
GC Column: RXI-5MS (0.25 mm)	Analysis Date: 8/23/07 10:16:00 PM
Level (low/med): LOW	Sample wt/vol: 30.06 G
% Moisture: 15	Dilution Factor: 1
PH:	Conc. Extract Volume: 1000 (uL)
GPC Cleanup(Y/N): N	Injection Volume: 1 (ul)
Method: SW846 8270BNA	Extraction Type: 3550B

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
218-01-9	Chrysene	20	1800	
117-81-7	bis(2-Ethylhexyl)phthalate	200		U
117-84-0	Di-n-octylphthalate	200		U
205-99-2	Benzo[b]fluoranthene	200	2200	D1
207-08-9	Benzo[k]fluoranthene	200	830	D1
50-32-8	Benzo[a]pyrene	20	1600	
193-39-5	Indeno[1,2,3-cd]pyrene	20	790	
53-70-3	Dibenz[a,h]anthracene	12	280	
191-24-2	Benzo[g,h,i]perylene	20	1000	

Qualifier Definitions
 U = Undetected
 B = Compound detected in method blank
 E = Estimated value
 J = Estimated concentration.
 D = Dilution
 D1 = C13286.D (Analysis Time: 08/25/07 03:51:00 , Dil. Factor= 10.0)

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#: SS7	
Lab Name: EMSL ANALYTICAL	Project: Bronx River Art Center
EMSL Sample ID: 010703757-0007	Sample Matrix: Soils
Lab File ID: V11708.D	Sampling Date: 8/20/2007
Instrument ID: VOA MSD-V	Analysis Date: 8/21/2007 21:40:00
Analyst: WRF	Level (low/med): LOW
GC Column: RTX-502.2 (0.25 mm)	Nominal Amount: 5 G
Sample wt/vol: 5 G	Method: SW846 8260B
Dilution Factor: 1	Moisture(%): 12
Sample Container: Jar (SW-846 5035)	
Heated Purge (Y/N): Y	

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
75-71-8	Dichlorodifluoromethane	1.1		U
74-87-3	Chloromethane	1.1		U
75-01-4	Vinyl chloride	1.1		U
74-83-9	Bromomethane	1.1		U
75-00-3	Chloroethane	1.1		U
75-69-4	Trichlorofluoromethane	1.1		U
107-02-8	Acrolein	57		U
76-13-1	Freon 113(1,1,2-Trichlorotrifluoroethan	1.1		U
75-35-4	1,1-Dichloroethene	1.1		U
67-64-1	Acetone	11	24	U
75-15-0	Carbon disulfide	1.1		U
75-09-2	Methylene chloride	1.1	5.6	B
75-65-0	tert-Butyl Alcohol	11		U
156-60-5	trans-1,2-Dichloroethene	1.1		U
1634-04-4	Methyl-tert butyl ether	1.1		U
107-13-1	Acrylonitrile	1.1		U
75-34-3	1,1-Dichloroethane	1.1		U
594-20-7	2,2-Dichloropropane	1.1		U
156-59-2	cis-1,2-Dichloroethene	1.1		U
78-93-3	2-Butanone	2.3		U
74-97-1	Bromochloromethane	1.1		U
67-66-3	Chloroform	1.1		U
71-55-6	1,1,1-Trichloroethane	1.1		U
56-23-1	Carbon tetrachloride	1.1		U
563-58-6	1,1-Dichloropropene	1.1		U
71-43-2	Benzene	0.57		U
107-06-2	1,2-Dichloroethane	1.1		U
79-01-6	Trichloroethene	1.1		U
78-87-1	1,2-Dichloropropane	1.1		U
74-95-3	Dibromomethane	1.1		U
75-27-4	Bromodichloromethane	1.1		U
110-75-8	2-Chloroethyl vinyl ether	23		U
10061-01-5	cis-1,3-Dichloropropene	1.1		U

Printed: 08/22/07 02:57:58 PM

FORM1--VOA

SampleList: 082107VA

ERM: V:\VOAERMS\8260ERMS\8260.erm

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SS7	
Lab Name:	EMSL ANALYTICAL	Project:	Bronx River Art Center
EMSL Sample ID:	010703757-0007	Sample Matrix:	Soils
Lab File ID:	V11708.D	Sampling Date:	8/20/2007
Instrument ID:	VOA MSD-V	Analysis Date:	8/21/2007 21:40:00
Analyst:	WRF	Level (low/med):	LOW
GC Column:	RTX-502.2 (0.25 mm)	Nominal Amount:	5 G
Sample wt/vol:	5 G	Method:	SW846 8260B
Dilution Factor:	1	Moisture(%)	12
Sample Container:	Jar (SW-846 5035)		
Heated Purge (Y/N):	Y		

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
108-10-1	4-Methyl-2-pentanone	11		U
108-88-3	Toluene	1.1		U
10061-02-6	trans-1,3-Dichloropropene	1.1		U
79-00-1	1,1,2-Trichloroethane	1.1		U
127-18-4	Tetrachloroethene	1.1		U
142-28-9	1,3-Dichloropropane	1.1		U
591-78-6	2-Hexanone	11		U
124-48-1	Dibromochloromethane	1.1		U
106-93-4	1,2-Dibromoethane	1.1		U
108-90-7	Chlorobenzene	1.1		U
630-20-6	1,1,1,2-Tetrachloroethane	1.1		U
100-41-4	Ethylbenzene	1.1		U
108-38-3	Xylene (para & meta)	1.1		U
95-47-6	Xylene (Ortho)	1.1		U
100-42-1	Styrene	1.1		U
75-25-2	Bromoform	1.1		U
98-82-8	Isopropylbenzene	1.1		U
108-86-1	Bromobenzene	1.1		U
79-34-1	1,1,2,2-Tetrachloroethane	1.1		U
96-18-4	1,2,3-Trichloropropane	1.1		U
103-65-1	n-Propylbenzene	1.1		U
110-57-6	trans-1,4-Dichloro-2-butene	2.3		U
95-49-8	2-Chlorotoluene	1.1		U
106-43-4	4-Chlorotoluene	1.1		U
108-67-8	1,3,5-Trimethylbenzene	1.1		U
98-06-6	tert-Butylbenzene	1.1		U
95-63-6	1,2,4-Trimethylbenzene	1.1		U
135-98-8	sec-Butylbenzene	1.1		U
541-73-1	1,3-Dichlorobenzene	1.1		U
99-87-6	4-Isopropyltoluene	1.1		U
106-46-7	1,4-Dichlorobenzene	1.1		U
95-50-1	1,2-Dichlorobenzene	1.1		U
104-51-8	n-Butylbenzene	1.1		U

Printed: 08/22/07 02:57:58 PM

FORM1--VOA

2 of 3

SampleList: 082107VA

ERM: V:\VOA\ERMS\8260\ERMS\8260.erm

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SS7		
Lab Name:	EMSL ANALYTICAL	Project:	Bronx River Art Center	
EMSL Sample ID:	010703757-0007	Sample Matrix:	Soils	
Lab File ID:	V11708.D	Sampling Date:	8/20/2007	
Instrument ID:	VOA MSD-V	Analysis Date:	8/21/2007 21:40:00	
Analyst:	WRF	Level (low/med):	LOW	
GC Column:	RTX-502.2 (0.25 mm)	Nominal Amount:	5 G	
Sample wt/vol:	5 G	Method:	SW846 8260B	
Dilution Factor:	1	Moisture(%)	12	
Sample Container:	Jar (SW-846 5035)			
Heated Purge (Y/N):	Y			

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
96-12-8	1,2-Dibromo-3-chloropropane	1.1		U
120-82-1	1,2,4-Trichlorobenzene	1.1		U
87-68-3	Hexachlorobutadiene	1.1		U
91-20-3	Naphthalene	1.1		U
87-61-6	1,2,3-Trichlorobenzene	1.1		U

Qualifier Definitions
 U = Undetected
 B = Compound detected in method blank
 E = Estimated value
 J = Estimated concentration.
 D = Dilution

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		SS7	
Lab Name:	EMSL Analytical Inc.	Project:	Bronx River Art Center
EMSL Sample ID:	010703757-0007	Sample Matrix:	Soils
Lab File ID:	A08058.D	Sampling Date:	8/20/07
Instrument ID:	SVOA MSD-A	Date Extracted:	8/22/07
Analyst:	EAA	Analysis Date:	8/23/07 09:46:00 PM
GC Column:	RXI-5MS (0.25 mm)	Sample wt/vol:	30.07 G
Level (low/med):	LOW	Dilution Factor:	1
% Moisture:	12	Conc. Extract Volume:	1000 (uL)
PH:		Injection Volume:	1 (ul)
GPC Cleanup(Y/N):	N	Extraction Type:	3550B
Method:	SW846 8270BNA		

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
62-75-9	N-nitrosodimethylamine	190		U
108-95-2	Phenol	38		U
100-51-6	Benzyl alcohol	190		U
111-44-4	bis(2-Chloroethyl)ether	190		U
95-57-8	2-Chlorophenol	190		U
541-73-1	1,3-Dichlorobenzene	190		U
106-46-7	1,4-Dichlorobenzene	190		U
95-50-1	1,2-Dichlorobenzene	190		U
95-48-7	2-Methylphenol	38		U
108-60-1	bis(2-chloroisopropyl)ether	190		U
1319-77-3	3+4-Methylphenol	190		U
621-64-7	N-Nitroso-Di-n-propylamine	190		U
67-72-1	Hexachloroethane	190		U
65-85-0	Benzoic Acid	380		U
98-95-3	Nitrobenzene	190		U
78-59-1	Isophorone	190		U
88-75-5	2-Nitrophenol	190		U
105-67-9	2,4-Dimethylphenol	190		U
111-91-1	bis(2-Chloroethoxy)methane	190		U
120-83-2	2,4-Dichlorophenol	190		U
120-82-1	1,2,4-Trichlorobenzene	190		U
91-20-3	Naphthalene	19	9.4	J
106-47-8	4-Chloroaniline	190		U
87-68-3	Hexachlorobutadiene	190		U
59-50-7	4-Chloro-3-methylphenol	190		U
91-58-7	2-Chloronaphthalene	190		U
91-57-6	2-Methylnaphthalene	19		U
77-47-4	Hexachlorocyclopentadiene	190		U
88-06-2	2,4,6-Trichlorophenol	190		U
95-95-4	2,4,5-Trichlorophenol	38		U

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#: SS7	
Lab Name:	EMSL Analytical Inc.
EMSL Sample ID:	010703757-0007
Lab File ID:	A08058.D
Instrument ID:	SVOA MSD-A
Analyst:	EAA
GC Column:	RXI-5MS (0.25 mm)
Level (low/med):	LOW
% Moisture:	12
PH:	
GPC Cleanup(Y/N):	N
Method:	SW846 8270BNA
Project:	Bronx River Art Center
Sample Matrix:	Soils
Sampling Date:	8/20/07
Date Extracted:	8/22/07
Analysis Date	8/23/07 09:46:00 PM
Sample wt/vol:	30.07 G
Dilution Factor:	1
Conc. Extract Volume:	1000 (uL)
Injection Volume:	1 (ul)
Extraction Type:	3550B

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
88-74-4	2-Nitroaniline	190		U
131-11-3	Dimethylphthalate	190		U
208-96-8	Acenaphthylene	19	69	
606-20-2	2,6-Dinitrotoluene	190		U
99-09-2	3-Nitroaniline	190		U
83-32-9	Acenaphthene	19	36	
51-28-5	2,4-Dinitrophenol	190		U
100-02-7	4-Nitrophenol	38		U
132-64-9	Dibenzofuran	190	19	J
121-14-2	2,4-Dinitrotoluene	190		U
84-66-2	Diethylphthalate	190		U
86-73-7	Fluorene	19	33	
7005-72-3	4-Chlorophenyl-phenylether	190		U
100-01-6	4-Nitroaniline	190		U
534-52-1	4,6-Dinitro-2-methylphenol	190		U
86-30-6	n-Nitrosodiphenylamine	190		U
122-66-7	1,2-Diphenylhydrazine (as azobenzene)	190		U
101-55-3	4-Bromophenyl-phenylether	190		U
118-74-1	Hexachlorobenzene	190		U
87-86-5	Pentachlorophenol	190		U
85-01-08	Phenanthrene	19	600	
120-12-7	Anthracene	19	140	
86-74-8	Carbazole	190	70	J
84-74-2	Di-n-butylphthalate	190	56	JB
206-44-0	Fluoranthene	19	1300	
92-87-5	Benzidine	190		U
129-00-0	Pyrene	19	1200	
85-68-7	Butylbenzylphthalate	190		U
56-55-3	Benzo[a]anthracene	19	630	
91-94-1	3,3'-Dichlorobenzidine	190		U

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#: SS7	
Lab Name: EMSL Analytical Inc.	
EMSL Sample ID: 010703757-0007	Project: Bronx River Art Center
Lab File ID: A08058.D	Sample Matrix: Soils
Instrument ID: SVOA MSD-A	Sampling Date: 8/20/07
Analyst: EAA	Date Extracted: 8/22/07
GC Column: RXI-5MS (0.25 mm)	Analysis Date: 8/23/07 09:46:00 PM
Level (low/med): LOW	Sample wt/vol: 30.07 G
% Moisture: 12	Dilution Factor: 1
PH:	Conc. Extract Volume: 1000 (uL)
GPC Cleanup(Y/N): N	Injection Volume: 1 (ul)
Method: SW846 8270BNA	Extraction Type: 3550B

CAS NO	COMPOUND	Report Limit (µg/Kg)	CONC. (µg/Kg)	Q
218-01-9	Chrysene	19	620	
117-81-7	bis(2-Ethylhexyl)phthalate	190	32	J
117-84-0	Di-n-octylphthalate	190		U
205-99-2	Benzo[b]fluoranthene	19	480	
207-08-9	Benzo[k]fluoranthene	19	420	
50-32-8	Benzo[a]pyrene	19	590	
193-39-5	Indeno[1,2,3-cd]pyrene	19	480	
53-70-3	Dibenz[a,h]anthracene	12		U
191-24-2	Benzo[g,h,i]perylene	19	570	

Qualifier Definitions
 U = Undetected
 B = Compound detected in method blank
 E = Estimated value
 J = Estimated concentration.
 D = Dilution

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		Twp-4		
Lab Name:	EMSL ANALYTICAL	Project:	Bronx River Art Center	
EMSL Sample ID:	010703757-0008	Sample Matrix:	Waste Water	
Lab File ID:	T0929.D	Sampling Date:	8/20/2007	
Instrument ID:	VOA MSD-T	Analysis Date:	8/21/2007 17:07:00	
Analyst:	AF	Level (low/med):	LOW	
GC Column:	RTX-502.2 (0.25 mm)	Nominal Amount:	5 ML	
Sample wt/vol:	5 ML	Method:	SW846 8260B	
Dilution Factor:	1			
Heated Purge (Y/N):	N			

CAS NO	COMPOUND	Report Limit (µg/L)	CONC. (µg/L)	Q
75-71-8	Dichlorodifluoromethane	1.0		U
74-87-3	Chloromethane	1.0		U
75-01-4	Vinyl chloride	1.0		U
74-83-9	Bromomethane	5.0		U
75-00-3	Chloroethane	1.0		U
75-69-4	Trichlorofluoromethane	1.0		U
107-02-8	Acrolein	25		U
76-13-1	Freon 113(1,1,2-Trichlorotrifluoroethan	1.0		U
75-35-4	1,1-Dichloroethene	1.0		U
67-64-1	Acetone	10	2.2	J
75-15-0	Carbon disulfide	1.0		U
75-09-2	Methylene chloride	1.0	2.0	B
75-65-0	tert-Butyl Alcohol	10		U
156-60-5	trans-1,2-Dichloroethene	1.0		U
1634-04-4	Methyl-tert butyl ether	1.0		U
107-13-1	Acrylonitrile	1.0		U
75-34-3	1,1-Dichloroethane	1.0		U
594-20-7	2,2-Dichloropropane	1.0		U
156-59-2	cis-1,2-Dichloroethene	1.0		U
78-93-3	2-Butanone	2.0		U
74-97-1	Bromochloromethane	1.0		U
67-66-3	Chloroform	1.0		U
71-55-6	1,1,1-Trichloroethane	1.0		U
56-23-1	Carbon tetrachloride	1.0		U
563-58-6	1,1-Dichloropropene	1.0		U
71-43-2	Benzene	0.50		U
107-06-2	1,2-Dichloroethane	1.0		U
79-01-6	Trichloroethene	1.0		U
78-87-1	1,2-Dichloropropane	1.0		U
74-95-3	Dibromomethane	1.0		U
75-27-4	Bromodichloromethane	1.0		U
110-75-8	2-Chloroethyl vinyl ether	20		U
10061-01-5	cis-1,3-Dichloropropene	1.0		U

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		Twp-4	
Lab Name:	EMSL ANALYTICAL	Project:	Bronx River Art Center
EMSL Sample ID:	010703757-0008	Sample Matrix:	Waste Water
Lab File ID:	T0929.D	Sampling Date:	8/20/2007
Instrument ID:	VOA MSD-T	Analysis Date:	8/21/2007 17:07:00
Analyst:	AF	Level (low/med):	LOW
GC Column:	RTX-502.2 (0.25 mm)	Nominal Amount:	5 ML
Sample wt/vol:	5 ML	Method:	SW846 8260B
Dilution Factor:	1		
Heated Purge (Y/N):	N		

CAS NO	COMPOUND	Report Limit (µg/L)	CONC. (µg/L)	Q
108-10-1	4-Methyl-2-pentanone	10		U
108-88-3	Toluene	1.0		U
10061-02-6	trans-1,3-Dichloropropene	1.0		U
79-00-1	1,1,2-Trichloroethane	1.0		U
127-18-4	Tetrachloroethene	1.0		U
142-28-9	1,3-Dichloropropane	1.0		U
591-78-6	2-Hexanone	10		U
124-48-1	Dibromochloromethane	1.0		U
106-93-4	1,2-Dibromoethane	1.0		U
108-90-7	Chlorobenzene	1.0		U
630-20-6	1,1,1,2-Tetrachloroethane	1.0		U
100-41-4	Ethylbenzene	1.0		U
108-38-3	Xylene (para & meta)	1.0		U
95-47-6	Xylene (Ortho)	1.0		U
100-42-1	Styrene	1.0		U
75-25-2	Bromoform	1.0		U
98-82-8	Isopropylbenzene	1.0		U
108-86-1	Bromobenzene	1.0		U
79-34-1	1,1,2,2-Tetrachloroethane	1.0		U
96-18-4	1,2,3-Trichloropropane	1.0		U
103-65-1	n-Propylbenzene	1.0		U
110-57-6	trans-1,4-Dichloro-2-butene	2.0		U
95-49-8	2-Chlorotoluene	1.0		U
106-43-4	4-Chlorotoluene	1.0		U
108-67-8	1,3,5-Trimethylbenzene	1.0		U
98-06-6	tert-Butylbenzene	1.0		U
95-63-6	1,2,4-Trimethylbenzene	1.0		U
135-98-8	sec-Butylbenzene	1.0		U
541-73-1	1,3-Dichlorobenzene	1.0		U
99-87-6	4-Isopropyltoluene	1.0		U
106-46-7	1,4-Dichlorobenzene	1.0		U
95-50-1	1,2-Dichlorobenzene	1.0		U
104-51-8	n-Butylbenzene	1.0		U

EMSL Analytical Inc.

VOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		Twp-4		
Lab Name:	EMSL ANALYTICAL			
EMSL Sample ID:	010703757-0008	Project:	Bronx River Art Center	
Lab File ID:	T0929.D	Sample Matrix:	Waste Water	
Instrument ID:	VOA MSD-T	Sampling Date:	8/20/2007	
Analyst:	AF	Analysis Date	8/21/2007 17:07:00	
GC Column:	RTX-502.2 (0.25 mm)	Level (low/med):	LOW	
Sample wt/vol:	5 ML	Nominal Amount:	5 ML	
Dilution Factor:	1	Method:	SW846 8260B	
Heated Purge (Y/N):	N			

CAS NO	COMPOUND	Report Limit (µg/L)	CONC. (µg/L)	Q
96-12-8	1,2-Dibromo-3-chloropropane	1.0		U
120-82-1	1,2,4-Trichlorobenzene	1.0		U
87-68-3	Hexachlorobutadiene	1.0		U
91-20-3	Naphthalene	1.0		U
87-61-6	1,2,3-Trichlorobenzene	1.0		U

Qualifier Definitions
 U = Undetected
 B = Compound detected in method blank
 E = Estimated value
 J = Estimated concentration.
 D = Dilution

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: EMSL Analytical Inc.		Customer Sample#: Twp-4
EMSL Sample ID: 010703757-0008	Project: Bronx River Art Center	
Lab File ID: C13308.D	Sample Matrix: Waste Water	
Instrument ID: SVOA MSD-C	Sampling Date: 8/20/07	
Analyst: EAA	Date Extracted: 8/22/07	
GC Column: RXI-5MS (0.25 mm)	Analysis Date: 8/26/07 10:10:00 PM	
Level (low/med): LOW	Sample wt/vol: 830 ML	
% Moisture:	Dilution Factor: 1	
PH:	Conc. Extract Volume: 1000 (uL)	
GPC Cleanup(Y/N): N	Injection Volume: 1 (ul)	
Method: EPA 625 BNA	Extraction Type: 3520C	

CAS NO	COMPOUND	Report Limit (µg/L)	CONC. (µg/L)	Q
62-75-9	N-nitrosodimethylamine	0.24		U
108-95-2	Phenol	1.7		U
111-44-4	bis(2-Chloroethyl)ether	1.2		U
95-57-8	2-Chlorophenol	0.89		U
541-73-1	1,3-Dichlorobenzene	0.42		U
106-46-7	1,4-Dichlorobenzene	0.42		U
95-50-1	1,2-Dichlorobenzene	0.35		U
108-60-1	bis(2-chloroisopropyl)ether	0.55		U
621-64-7	N-Nitroso-Di-n-propylamine	0.54		U
67-72-1	Hexachloroethane	0.39		U
98-95-3	Nitrobenzene	0.60		U
78-59-1	Isophorone	0.33		U
88-75-5	2-Nitrophenol	2.4		U
105-67-9	2,4-Dimethylphenol	1.7		U
111-91-1	bis(2-Chloroethoxy)methane	0.43		U
120-83-2	2,4-Dichlorophenol	2.7		U
120-82-1	1,2,4-Trichlorobenzene	0.55		U
91-20-3	Naphthalene	0.27	0.46	
87-68-3	Hexachlorobutadiene	0.52		U
59-50-7	4-Chloro-3-methylphenol	1.6		U
91-58-7	2-Chloronaphthalene	0.47		U
77-47-4	Hexachlorocyclopentadiene	1.6		U
88-06-2	2,4,6-Trichlorophenol	3.3		U
131-11-3	Dimethylphthalate	0.37		U
208-96-8	Acenaphthylene	0.24		U
606-20-2	2,6-Dinitrotoluene	0.35		U
83-32-9	Acenaphthene	0.30		U
51-28-5	2,4-Dinitrophenol	1.8		U
100-02-7	4-Nitrophenol	3.8		U
121-14-2	2,4-Dinitrotoluene	0.53		U

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#: Twp-4	
Lab Name: EMSL Analytical Inc.	
EMSL Sample ID: 010703757-0008	Project: Bronx River Art Center
Lab File ID: C13308.D	Sample Matrix: Waste Water
Instrument ID: SVOA MSD-C	Sampling Date: 8/20/07
Analyst: EAA	Date Extracted: 8/22/07
GC Column: RXI-5MS (0.25 mm)	Analysis Date: 8/26/07 10:10:00 PM
Level (low/med): LOW	Sample wt/vol: 830 ML
% Moisture:	Dilution Factor: 1
PH:	Conc. Extract Volume: 1000 (uL)
GPC Cleanup(Y/N): N	Injection Volume: 1 (ul)
Method: EPA 625 BNA	Extraction Type: 3520C

CAS NO	COMPOUND	Report Limit (µg/L)	CONC. (µg/L)	Q
84-66-2	Diethylphthalate	0.47		U
86-73-7	Fluorene	0.36		U
7005-72-3	4-Chlorophenyl-phenylether	0.40		U
534-52-1	4,6-Dinitro-2-methylphenol	2.5		U
86-30-6	n-Nitrosodiphenylamine	0.36		U
122-66-7	1,2-Diphenylhydrazine(as azo)	6.0		U
101-55-3	4-Bromophenyl-phenylether	0.49		U
118-74-1	Hexachlorobenzene	0.60		U
87-86-5	Pentachlorophenol	3.1		U
85-01-08	Phenanthrene	0.33	0.72	
120-12-7	Anthracene	0.45		U
84-74-2	Di-n-butylphthalate	1.9		U
206-44-0	Fluoranthene	0.27	1.3	
92-87-5	Benzidine	0.81		U
129-00-0	Pyrene	0.24	1.3	
85-68-7	Butylbenzylphthalate	0.29		U
56-55-3	Benzo[a]anthracene	0.31	0.83	
91-94-1	3,3'-Dichlorobenzidine	1.5		U
218-01-9	Chrysene	0.24	0.81	
117-81-7	bis(2-Ethylhexyl)phthalate	0.66	14	
117-84-0	Di-n-octylphthalate	0.30		U
205-99-2	Benzo[b]fluoranthene	0.25	4.8	
207-08-9	Benzo[k]fluoranthene	0.34	0.80	
50-32-8	Benzo[a]pyrene	0.29	4.8	
193-39-5	Indeno[1,2,3-cd]pyrene	0.28	2.0	
53-70-3	Dibenz[a,h]anthracene	0.39		U
191-24-2	Benzo[g,h,i]perylene	0.25	1.3	

EMSL Analytical Inc.

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

Customer Sample#:		Twp-4		
Lab Name:	EMSL Analytical Inc.			
EMSL Sample ID:	010703757-0008	Project:	Bronx River Art Center	
Lab File ID:	C13308.D	Sample Matrix:	Waste Water	
Instrument ID:	SVOA MSD-C	Sampling Date:	8/20/07	
Analyst:	EAA	Date Extracted:	8/22/07	
GC Column:	RXI-5MS (0.25 mm)	Analysis Date:	8/26/07 10:10:00 PM	
Level (low/med):	LOW	Sample wt/vol:	830 ML	
% Moisture:		Dilution Factor:	1	
PH:		Conc. Extract Volume:	1000 (uL)	
GPC Cleanup(Y/N):	N	Injection Volume:	1 (ul)	
Method:	EPA 625 BNA	Extraction Type:	3520C	

CAS NO	COMPOUND	Report Limit (µg/L)	CONC. (µg/L)	Q
Qualifier Definitions U = Undetected B = Compound detected in method blank E = Estimated value J = Estimated concentration. D = Dilution				

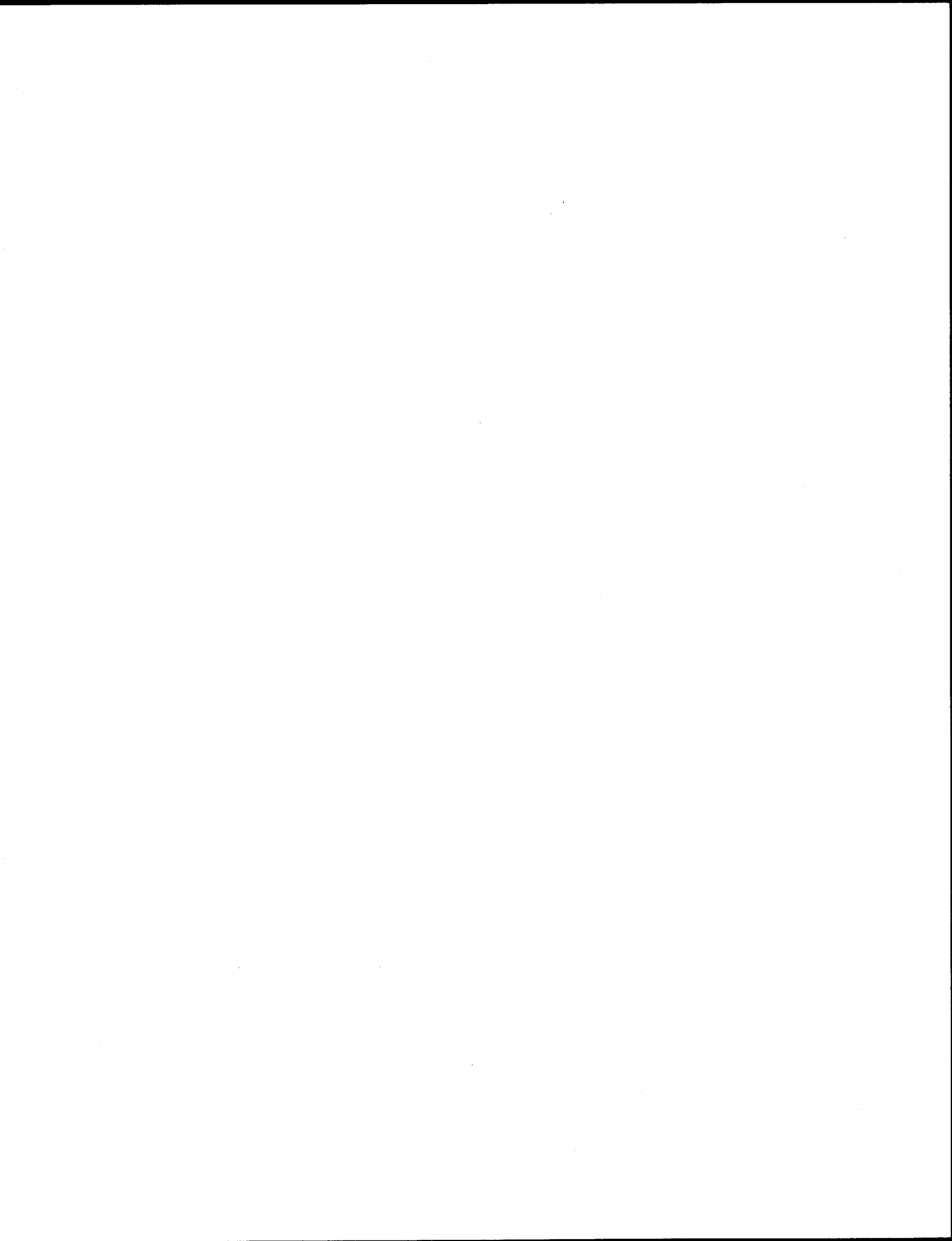
Boony River Art Center

EMSL Analytical, Inc. Environmental Chemistry Lab Service 3 Cooper St., Westmont, NJ 08108 TEL: (856) 858-4800 FAX: (856) 858-4571		Chain of Custody / Analysis Request Form Print ALL Information. Incomplete chain of custody could result in the delay of analysis.		EMSL Project # 010703757 Account Rep: Indicate State where samples were collected:																				
REPORT RESULTS TO: Name: <u>Steve Frank</u> Company: <u>WRO</u> Address: <u>690 Delaware Ave</u> City: <u>Buttalo</u> State: <u>NY</u> Zip: <u></u> Tel: <u>718 3213134</u> Fax: <u></u> Email: <u>Frank5@WRO.COM</u>		SEND INVOICE TO: Name: <u></u> PO#: <u></u> Company: <u></u> Address: <u>Same</u> City: <u></u> State: <u></u> Zip: <u></u> Tel: <u></u> Fax: <u></u>		TURNAROUND TIME Standard Turnaround Time is 10 working days <input type="checkbox"/> The following turnaround times require lab approval: <input checked="" type="checkbox"/> 5 day <input type="checkbox"/> 96 Hrs <input type="checkbox"/> 72 Hrs <input type="checkbox"/> 48 Hrs <input type="checkbox"/> 24 Hrs Approved by <u></u>																				
PROJECT NAME: <u>BRAC</u> Date of Sample Shipment: <u></u>		# of Samples in Shipment: <u></u>																						
Sampled by: (Signature) <u></u>		Matrix		Preservative																				
Sampling		List Method and Test Needed		Condition Noted																				
Lab Sample Number	Client Sample ID	Comp	Grab	WATER	SOIL	AIR	SLUDGE	OTHER	HCl	HNO3	H2SO4	OTHER	DATE	TIME	501	502	503	504	505	506	507	508	509	510
1.	551			X									8/20		X	X	X	X	X	X	X	X	X	X
2.	552			X											X	X	X	X	X	X	X	X	X	X
3.	553			X											X	X	X	X	X	X	X	X	X	X
4.	554			X											X	X	X	X	X	X	X	X	X	X
5.	555			X											X	X	X	X	X	X	X	X	X	X
6.	556			X											X	X	X	X	X	X	X	X	X	X
7.	557			X											X	X	X	X	X	X	X	X	X	X
8.	Temp 4			X											X	X	X	X	X	X	X	X	X	X
9.																								
10.																								
Released By Signature	Date & Time Released	Delivery Method	Received By Signature	Agency Signature	Date & Time Received	Condition Noted																		
Tracy TBBB	8/20/07	EMSL	Tracy TBBB	EMSL	8-20-07 4:00	40-13/12																		
Tracy TBBB	8-20-07 9:45	EMSL	Tracy TBBB	EMSL	8/21/07																			

2007 AUG 21 AM 10:35
WESTMONT. N.J.

Please indicate reporting requirements: ☐ 1. Results Only ☐ 2. Results and QC ☐ 3. Reduced Deliverables ☐ 4. Disk Deliverable ☐ 5. Other

Comments:



21 Penn Plaza, 360 West 31st Street, 8th Floor New York, NY 10001 T: 212.479.5400 F: 212.479.5444

To: Julia McCarthy (Sage and Coombe Architects)

From: Jared Green, PE (Langan)

Date: 6 May 2010

**Re: BRAC
Cellar Abandonment
Bronx, New York
Langan Project No.: 170033201**

This memorandum provides a summary of our design intent regarding the abandonment of the existing cellar. We understand that DDC had a number of questions regarding the usage of the lightweight fill. This memorandum seeks to address the following items.

- 1) The density and permeability of the lightweight flowable fill;
- 2) The bearing capacity of the lightweight flowable fill; and
- 3) Clarification regarding the requirement to puncture the existing slab

Cellar Abandonment

The proposed scope of work includes the complete abandonment of the existing cellar. Specifically, the cellar will be filled with a lightweight flowable fill, and the storage space has been relocated. After the consideration of a number of options, this was the most cost-effective means creating a renovation that complies with FEMA regulations for buildings within the flood plain. The major advantage of this approach is that it eliminates the requirement to waterproof the foundation walls (in the event that the space was to be habitable).

Lightweight Flowable Fill

The lightweight flowable fill, as specified is to consist of low density cellular concrete manufactured by Geofill (or an approved equivalent manufacturer). This material consists of a non-pervious, low density cellular concrete and is typically used in the industry to fill abandoned cellar spaces.

Prior to placing the lightweight flowable fill, all openings in the foundation walls will be filled with masonry before the cellar is filled. Foam generating equipment will be used to mix and blend with cementitious slurry. The resulting impervious material is similar to a concrete design mix, which will not allow water to pass through the material.

The density of the lightweight flowable fill ranges between 24 to 30 lbs/cu-ft. As the density of the material is so low, there is no requirement to puncture the existing slab. The minimum compressive strength at 28 days is 40 lbs/sq-in. The resulting material is excavated with hand-excavation tools (jackhammers, etc). Footings bearing on this material in the future should be sized for an allowable bearing capacity of 2 tons/sq-ft.

MEMO

BRAC
Cellar Abandonment
Bronx, New York
Langan Project No.: 170033201
6 May 2010- Page 2 of 2

Although completely up to the contractor's means and methods, the lightweight flowable fill should be able to be installed from the concrete sidewalk hatch. The installation of the lightweight flowable fill should not have an effect on the foundation walls provided the flowable fill is placed in lifts no greater than a few feet at a time. Placing in lifts limits the amount of unbalanced earth pressure, so the foundation walls would not need to be protected. Due to the low density of the material, the lightweight flowable fill should not cause settlement of the existing rat slab.

The first floor slab will be designed as a slab on grade. The presence of the lightweight fill within the abandoned cellar is essentially a large concrete mass between the foundation walls; stormwater that touches the foundation walls will not undermine the walls or the footings.

Closure

We trust that this addresses the comments raised by the DDC. If anything remains unclear, feel free to give us a call.

\\Langan.com\data\NY\data2\170033201\Office Data\Correspondence\2010-05-05 lightweight fill memo.docx



Environmental and Planning Consultants

440 Park Avenue South
New York, NY 10016
tel: 800 899-AKRF
fax: 212 213-3191
www.akrf.com

August 13, 2010

Ms. Gail Nathan, Executive Director
Bronx River Art Center
1087 East Tremont Avenue
Bronx, NY 10460

Re: Phase I Environmental Site Assessment
Bronx River Art Center - Bronx, New York
AKRF Project Number 02965

Dear Ms. Nathan:

AKRF, Inc. is pleased to submit this Phase I Environmental Site Assessment Report for the above-referenced property. This report includes the findings of a reconnaissance of the property, an evaluation of readily available historical information and selected environmental databases and electronic records. AKRF, Inc. met the requirements of American Society for Testing and Materials (ASTM) as established by ASTM Standard E1527-05 unless noted otherwise in Section 8.0: "Limitations and Data Gaps".

We appreciate the opportunity to provide you with our services. If you should have any questions or comments regarding the enclosed report, please do not hesitate to contact us.

Sincerely,
AKRF, Inc.

A handwritten signature in black ink, appearing to read 'MG' or similar initials, written over a horizontal line.

Marc S. Godick, LEP
Senior Vice President

A handwritten signature in black ink, appearing to read 'Asya Kleyn', written over a horizontal line.

Asya Kleyn
Environmental Engineer

Enc.

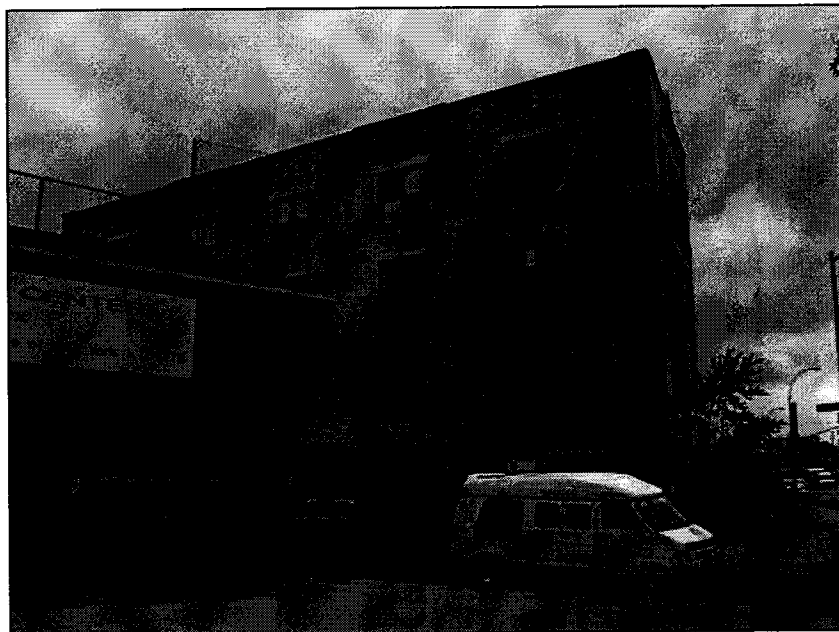
Bronx River Art Center

Tax Block 3141, Lot 1

BRONX, NEW YORK

Phase I Environmental Site Assessment

AKRF Project Number: 02965



Prepared for:

Bronx River Art Center
1087 East Tremont Avenue
Bronx, NY 10460

Prepared by:



AKRF, Inc.
440 Park Avenue South
New York, NY 10016
212-696-0670

AUGUST 2010

EXECUTIVE SUMMARY

AKRF, Inc. (AKRF) was retained by the Bronx River Art Center (BRAC) to perform a Phase I Environmental Site Assessment of a four-story (plus partial basement) brick and concrete art center and a rear courtyard area, located at 1087 East Tremont Avenue in the Bronx, New York (Tax Block 3141, Lot 1).

This Phase I Environmental Site Assessment was performed in conformance with ASTM Standard E1527-05, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Practice*. Any exceptions to, or deletions from, this practice are described in Section 8.0. The term "Recognized Environmental Condition" means the presence or likely presence of hazardous substances or petroleum at the property, including the ground, groundwater, or surface water at or under the property.

At the time of AKRF's reconnaissance, the property's approximately 8,300-square foot (sf) area included the four-story (plus partial basement) art center, occupying an approximately 4,500-sf footprint and a vacant, rear courtyard area. The surrounding area was occupied by residential, commercial and institutional properties and parkland.

This assessment revealed evidence of Recognized Environmental Conditions, as described in the first four bullets, and additional findings, as follows:

- A Limited Phase II Environmental Site Investigation conducted by LiRo Engineers, Inc. in September 2007 identified petroleum-related volatile organic compounds (VOCs) in a groundwater sample collected from the southwestern portion of the rear courtyard area. Evidence of VOC contamination was noted in the soil boring from which the sample was collected. No VOCs were detected in a second groundwater sample, collected on the western edge of the site (potentially upgradient with respect to groundwater flow). Trace concentrations of VOCs, including those related to petroleum use, were also identified in the soil samples. The detected VOCs may be attributable to historical auto repair uses on-site.

The Phase II also noted elevated concentrations of metals and semi-volatile organic compounds (SVOCs) in soil and groundwater, which may be attributable to the presence of urban fill beneath the Property. One soil sample (SS-6) contained lead at a concentration of 2,100 parts per million (ppm), which could be classified as hazardous waste; however, additional testing using the Toxicity Characteristic Leaching Procedure (TCLP) would be necessary to characterize the material. Elevated concentrations of mercury were detected in several of the soil samples. Based on the historical use of the Property for mercury thermometer manufacturing, additional testing, inclusive of shallow soil sampling, would be necessary to determine if the elevated mercury concentrations are attributable to historic use of the site or only related to urban fill.

Due to access limitations during the Phase II investigation, soil borings inside the building were advanced to six feet below grade. Although no evidence of contamination was noted in the indoor soil borings, such evidence was noted more than six feet below grade in the rear courtyard area and it is possible that contaminated soil and/or groundwater are also present in the former garage area more than six feet below grade (below soil sampling depth).

- One vaulted, concrete-encased fuel oil storage tank, approximately 1,500 gallons in size, was noted in the basement during the reconnaissance. Although the tank was aboveground, since the tank was encased in concrete and its exterior and bottom were not visible, current New York State regulations define this tank as an underground storage tank (UST). No NYSDEC or New York City Fire Department registrations for this tank were identified in regulatory databases. BRAC and New York

City Department of Housing Preservation and Development (HPD) representatives were not aware of the tank size, type of fuel oil used by the tank, or whether the tank had been tested for tightness. Potential releases from the tank could have affected soil and/or groundwater beneath the Property.

- Historical land use maps and Buildings department records identified historical auto repair, auto sales and unspecified industrial use of the building. City Directory records identified the use of the property by two thermometer companies on the Property in 1927 and 1940. The C of O for 1931 referenced use of the 2nd through 4th floors of the building as an unspecified factory, which may have been associated with manufacturing by the thermometer companies and the use of mercury. Additionally, the City Directory noted that an exterminating company (which may have used pesticides) existed on the Property in 1976. The surrounding area was historically mixed-use and included a north-adjacent rail yard, a dyer and cleaner to the north on the Bronx River, a cotton bleaching, dyeing and printing company and dry cleaning on the block to the south, and a filling station, auto repair and fireproof door manufacturing on the block to the west. A dry cleaner was identified on the block to the west in regulatory databases. Although the off-site uses may have affected groundwater beneath the Property, as noted above, no such impacts were noted in the upgradient groundwater sample collected during the 2007 Phase II investigation. Historical on-site and off-site uses of the Property may have resulted in releases of hazardous substances to the building interior as well as soil and/or groundwater.
- Paints and cleaning and maintenance chemicals in containers up to five gallons in size were observed throughout the building. Paint thinner and kerosene (a solvent) in approximately five-gallon containers were stored in some artists' studios, according to Ms. Nathan. According to Ms. Nathan, BRAC's children's classes used non-toxic water-based paints, most artists renting studios in the building used acrylic paints, and some used oil paints. According to Ms. Nathan, small amounts of excess oil paints and paint thinner were generally disposed of by wiping them with paper towels, which were placed in the trash. Small amounts of paint may also have been disposed of in the building's sinks. Paint staining was observed in a sink on the second floor. The containers were generally neatly stored and labeled and no staining or odors were noted in the storage areas. However, historical staining was noted on the floor of the former garage space.
- According to Ms. Nathan, pesticides were used in the building. However, pesticides were not stored on the Property and were applied as necessary by a pest control contractor.
- According to Ms. Nathan, rain-soaked insulation was installed under the building roof during past roof replacements, and mold may be present in the insulation.
- Based on the age of the Property building, asbestos-containing materials (ACM) may be present in the structure. According to Ms. Gail Nathan of BRAC, asbestos abatement had been conducted on the building's roof in the early 2000s and according to Ms. Stephani Resch of the New York City Department of Design and Construction (DDC), the building had been surveyed for asbestos. However, no documentation of the abatement and survey was provided to AKRF. Suspect ACM observed during the reconnaissance included: wall and ceiling plaster, sheetrock, thermal pipe insulation, vinyl stair cover and mastic, 12-inch x 12-inch vinyl floor tiles and mastic, and roofing and flashing materials. Thermal pipe insulation in the former garage on the ground floor was noted to be damaged. No suspect ACM were noted in the rear courtyard area.
- Based on the building's age, lead-based paint may be present. Painted surfaces in the occupied portions of the building were generally in good condition, although some surfaces in poor condition (chipped paint) were noted. Painted surfaces in the vacant former garage were in poor condition. At the time of the reconnaissance, portions of the building were used for art classes, including classes for

children aged seven and older. The building did not include a child care center or other facility where the extended presence of young children younger than seven years old would be typical. No painted surfaces were noted in the rear courtyard area of the Property.

- Fluorescent lights and electrical equipment may include components (e.g., capacitors and potting compounds) containing polychlorinated biphenyls (PCBs) and/or mercury. Unless fluorescent lighting fixtures, electrical equipment and hydraulic elevator equipment are in damaged condition, they do not present a potential hazard to human health.

RECOMMENDATIONS

- Since historical uses inside the building may have included thermometer manufacturing, AKRF recommends a mercury vapor survey of indoor air in the building, sampling of interior building materials and piping, surface (wipe) sampling, and shallow soil testing to supplement the Limited Phase II investigation to determine whether the historical use of the Property as a mercury thermometer manufacturer has affected the Property.
- The proposed renovation would involve excavation adjacent to, but not beneath, the Property building. The proposed renovation would also include filling of the basement and repair of the ground level floor slab, which would reduce the risk of potential vapor intrusion into the building. If no activities are planned that would disturb the building's concrete floor slab or subsurface soil or groundwater, subsurface conditions would not be expected to represent a potential health or environmental concern if the building continues in its current uses. Any cuts in the floor slab (e.g., for utility work) associated with the renovation should be sealed following the work to prevent potential vapor intrusion. If future plans for Property redevelopment involve subsurface disturbance beneath the Property building, additional subsurface testing is recommended to identify potential contamination in soil or groundwater beneath the building.
- Since evidence of contamination was identified during the 2007 investigation, AKRF recommends that soil disturbance on the Property be conducted in accordance with a Health and Safety Plan to address the contingency that contaminated soil could potentially be encountered. If petroleum-contaminated soil or any other type of contamination is identified, it should be managed in accordance with all applicable requirements, which may include spill reporting to the New York City Department of Environmental Protection (NYSDEC). Erosion and sediment control measures would also need to be implemented during soil disturbance to prevent sediment discharge to the Bronx River. Any excess material (which may include historic fill materials) associated with the construction should be properly disposed of off-site in accordance with all applicable regulations. Based on the elevated concentrations of lead and mercury identified in some soil samples during the 2007 investigation, some soil may require disposal as a regulated waste and potentially as hazardous waste; however, additional testing would be necessary to characterize the material.
- If dewatering is required during construction activities, water should be discharged in accordance with New York City Department of Environmental Protection (NYCDEP) requirements.
- The on-site fuel oil UST would be removed as part of the renovation. If required, the tank should be registered/deregistered with the NYSDEC and appropriately filed with the New York City Fire Department and/or Department of Buildings. The tank should be properly closed and removed, along with any contaminated soil. Any evidence of petroleum contamination should be reported to NYSDEC and/or other regulatory agencies, as applicable.
- The proposed renovation would include filling of the building's basement. Clean fill, not containing construction or demolition debris, should be used for this purpose.

- If mold is observed in insulation under the building's roof during renovation, the affected material should be properly removed and replaced in accordance with the applicable regulations and guidelines.
- Unless the damaged pipe insulation in the former garage is known to be non-ACM, this insulation should be sampled and, if determined to be ACM, removed or repaired in accordance with applicable requirements. Prior to initiating the planned renovation activities, an asbestos survey should be conducted to identify all ACM throughout the building. All abatement activities should be conducted in accordance with all applicable regulations. If the planned renovation work is not implemented, an appropriate operation and maintenance (O&M) plan should be developed to properly maintain all ACM throughout the building in accordance with applicable regulations.
- Any renovation or demolition activities with the potential to disturb lead-based paint are subject to a variety of requirements, including US Occupational Safety and Health Administration regulation 29 CFR 1926.62 (Lead Exposure in Construction).
- Unless there is labeling or test data that indicate that electrical equipment does not contain PCBs and that fluorescent lighting fixtures do not contain mercury and/or PCBs, disposal, if required, should be performed in accordance with applicable federal, state, and local regulations and guidelines.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	i
1.0 Introduction.....	1
2.0 Physical Site Description	2
2.1 General Site Conditions.....	2
2.2 Topography and Hydrogeology.....	3
2.3 Storage Tanks	4
2.3.1 Underground Storage Tanks (USTs).....	4
2.3.2 Aboveground Storage Tanks (ASTs).....	4
2.4 Polychlorinated Biphenyls (PCBs).....	5
2.5 Lead-Based Paint.....	5
2.6 Utilities	6
2.7 Waste Management and Chemical Handling	6
2.8 Radon.....	6
3.0 Asbestos-Containing Materials (ACM)	6
4.0 Adjacent Land Use.....	7
5.0 Property History and Records Review.....	7
5.1 Prior Ownership and Usage	7
5.1.1 Historical Land Use maps	7
5.1.2 Historical Aerial Photographs	9
5.1.3 Property Tax Files and Zoning Records.....	9
5.1.4 Recorded Land Title Records.....	9
5.1.5 Local Street Directories.....	9
5.2 Regulatory Review	10
5.2.1 Federal.....	10
5.2.2 State.....	12
5.2.3 Local.....	16
5.2.4 Additional Environmental Record Sources	17
6.0 User-Provided Information	17
7.0 Previous Studies.....	18
8.0 Limitations and Data Gaps.....	19
9.0 Conclusions and Recommendations	21
10.0 Signature Page	25
11.0 Qualifications.....	26
12.0 References.....	27

FIGURES

- Figure 1 – Project Site Location
Figure 2 – Project Site Detail

APPENDICES

- Appendix A – Photographic Documentation
Appendix B – NYSDEC Jurisdictional Determination
Appendix C – Historical Sanborn Maps
Appendix D – Regulatory Records Review
Appendix E – Local Records

1.0 INTRODUCTION

AKRF, Inc. (AKRF) was retained by the Bronx River Art Center (BRAC) to perform an Environmental Site Assessment of a four-story (plus partial basement) brick and concrete art center and an inactive construction site located at 1087 East Tremont Avenue in the Bronx, New York (Tax Block 3141, Lot 1).

At the time of AKRF's reconnaissance, the Property's approximately 8,300-square foot (sf) area included the four-story (plus partial basement) art center, occupying an approximately 4,500-sf footprint and a vacant, rear courtyard area. The surrounding area was occupied by residential, commercial and institutional properties and parkland.

The scope of services for this assessment was in conformance with ASTM Standard E1527-05 (*Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Practice*). Any exceptions to, or deletions from, this practice are described in Section 8.0. The scope included the following:

- Observations of the Property (reconnaissance) to identify potential sources or indications of hazardous substances, including: aboveground storage tanks (ASTs); underground storage tanks (USTs); tank vents and fill ports; transformers and other items that could contain polychlorinated biphenyls (PCBs), drums or areas where hazardous materials were used, stored, or disposed; stained surfaces and soils; stressed vegetation, leaks, odors. In addition, neighboring properties were viewed, but only from public rights-of-way, to identify similar concerns.
- Readily available geological and groundwater (hydrogeological) information was evaluated to assist in determining the potential for contamination migration within, from, and onto the Property.
- The reconnaissance of the Property included preliminarily identifying visible suspect asbestos-containing materials (ACMs) and the potential lead-based paint. However, no samples were collected or analyzed.
- A state database of radon concentrations was used to determine whether indoor radon levels in the general area (data are by county) generally comply with United States Environmental Protection Agency (USEPA) guidelines.
- Historical fire insurance maps for the Property and adjacent properties were reviewed to evaluate historic land uses.
- The following federal regulatory databases were reviewed to determine the regulatory status of the Property and other properties within the ASTM-defined radii: National Priority List (NPL); Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS); Emergency Response Notification System (ERNS); Toxic Chemical Release Inventory System (TRIS); the Permit Compliance System of Toxic Wastewater Discharges (WWD); the Air Discharge Facilities Index (ADF) and the USEPA Civil Enforcement Docket. The federal listing of facilities which are subject to corrective action under the Resource Conservation and Recovery Act (CORRACTS) is discussed with the State databases of RCRA listings.
- The following state regulatory databases were reviewed to determine the regulatory status of the Property, adjacent properties, and properties within a predetermined study area; the listings of hazardous material spills (SPILLS); Resource Conservation and Recovery Act Notifiers (RCRA); Chemical Bulk Storage (CBS); Solid Waste Facilities (SWF); Petroleum Bulk Storage (PBS); State Inactive Hazardous Waste Disposal Sites (SHWS); Major Oil Storage Facilities (MOSF); Brownfield Sites; and Historic Utility Sites.

- A review of NYC Fire Department (obtained as part of the database search) and online Buildings Department records for the Property was conducted to obtain information likely to be pertinent to this assessment.

2.0 PHYSICAL SITE DESCRIPTION

On June 10, 2010, Ms. Asya Kleyn of AKRF conducted a reconnaissance of the Property. Ms. Gail Nathan, the executive director of BRAC, Mr. Eric Charles, a building maintenance worker and assistant art instructor at BRAC, and Mr. Stephen Koren, a landscape architect at the New York City Department of Parks and Recreation (DPR), accompanied Ms. Kleyn through portions of the Property and answered pertinent questions. Neighboring properties were also viewed from public rights-of way. The weather was partly cloudy and approximately 75°F, the visibility good, and the premises generally adequately illuminated. Areas not adequately illuminated by natural and/or artificial light (including the ground-floor garage and portions of the basement) were viewed by flashlight. Photographs from the reconnaissance are included in Appendix A.

2.1 General Site Conditions

The Property consisted of one four-story (plus partial basement) brick and concrete building and a rear courtyard area. The building was lighted by fluorescent and incandescent lights and heated by a fuel oil-burning boiler. No elevators were present in the building.

At the time of the reconnaissance, the building was occupied by BRAC except for a vacant former garage on the ground floor. According to Ms. Nathan, the building was approximately 100 years old and historically contained auto repair and possibly an auto showroom. However, historical Sanborn maps indicated that the building was constructed between 1915 and 1951. Ms. Nathan indicated that by the 1960s or 1970s, the building was abandoned and acquired by the New York City Department of Housing Preservation and Development (HPD). In the late 1970s, the fourth floor was leased from HPD by the Bronx River Restoration Project as office and art class space. BRAC was originally part of the restoration project, and became an independent non-profit organization in 1987. At the time, BRAC occupied the fourth and ground floors. By the early 1990s, the second and third floors were also occupied by BRAC as studios that were rented to various artists.

The roof was covered with roll-on roofing and flashing in fair to good condition. A roof drain and air vents were observed on the roof. According to Ms. Nathan, the roof was replaced twice in the early 2000s due to leaks, and asbestos abatement was performed as part of the first replacement. Ms. Nathan noted that due to rainstorms during both roof replacements, wet insulation was installed beneath the roof. The air vents observed on the roof had been installed to dry the insulation; however, according to Ms. Nathan, darkened insulation was subsequently observed, and mold may be present in the insulation.

The BRAC space included: a classroom, offices and a ceramics studio on the fourth floor; studios on the second and third floors; and the lobby, gallery space and an office on the ground floor. Storage of art supplies and cleaning and maintenance chemicals in containers up to five gallons in size was observed throughout the BRAC space. Interior finishing materials included painted plaster and sheetrock walls and ceilings, and painted wood and 12"x12" vinyl tile floors.

The basement occupied only the southern portion of the building footprint and consisted of two rooms with concrete floors, metal and wooden ceilings, and brick or stone walls. The southern room was vacant except for an abandoned hot water tank. Several concrete platforms, elevated

approximately 6 inches above the floor, were noted in this area, and appeared to be part of the building's footings. Portions of the concrete floor were damaged and small asphalt patches, apparent historical water staining, and debris (building materials and trash) were noted on the floor. The asphalt patches appeared to be labeled with spray paint as test pits; however, neither Ms. Nathan nor Ms. Julia McCarthy of Sage and Coombe Architects (the project architect) were aware of test pit excavation in the building. The northern room contained a concrete-encased fuel oil tank, a fuel oil-burning boiler, a sump and electrical closets. Ms. Nathan was not certain whether the sump is connected to the municipal sewer system. Based on the size of the concrete block (approximately four by four by fifteen feet) it was estimated to be approximately 1,500 gallons in size. The sump was observed to be filled with water. Historical staining was observed on the concrete pad beneath the boiler, and a bucket containing a small amount of oil was placed under the piping connected to the boiler. The boiler room floor and the bottom of the tank encasement were damp due to a leaking water pipe, and could not be inspected for evidence of oil staining due to the moisture and poor lighting in the basement. No oil-like odors were noted. A fill port and vent pipe for the fuel oil tank were noted west-adjacent to the building.

The vacant former garage in the northern portion of the ground floor consisted of two rooms. These rooms had wood and concrete floors, concrete walls and metal ceilings. Most of the floor in the southern room was covered by paper and plastic sheeting and could not be observed. The former garage was filled by debris (building materials, lumber, furniture, radiators etc.) A structure consisting of a concrete pad and concrete block walls, approximately 15 feet by 15 feet wide and 4 feet high, was observed in the northern room. This structure contained a small amount of debris (bottles, furniture pieces, trash). Ms. Nathan was not certain of the function of this enclosure, but believed that it may have contained a petroleum storage tank that may have been removed by HPD. However, according to Ms. Laurie Schoeman, BRAC's Owner's Representative, Mr. Michael Davis of HPD was not aware of any tanks removed from the Property by HPD. Portions of the floor were noted to be damaged. Damaged thermal pipe insulation was observed. Historical staining was noted on the floor near the entrance. Two small, abandoned bathrooms partially filled with debris were located in the garage area.

At the time of a 2007 subsurface investigation summarized in Section 7.0, the northern portion of the Property was occupied by a vacant yard. According to Ms. Nathan, a portion of the yard was historically occupied by a vacant former garage until the building was demolished in 1999 or 2000. At the time of the 2010 reconnaissance, this area was vacant and had several trees protected by fencing. DPR had recently used this area for access and staging for the Bronx River Reconstruction project that involved creating an extension of the greenway and restoration along the Bronx River. It is proposed that this area will be a future garden area for BRAC. This area is referred to the "rear courtyard area" throughout this report. Soil in the rear courtyard area included fill material (brick fragments). According to Ms. Nathan and Mr. Koren, a garden would be built in this area. Mr. Koren also believed that fill excavated during construction of Lambert Houses (one block to the east) was placed on or near the Property. No evidence of contamination (odors, staining or stressed vegetation) was noted in the rear courtyard area.

Three round metal rims were observed in the East Tremont Avenue sidewalk in front of the building. The rims appeared to be the remnants of a historical fence rather than historical petroleum storage tank fill ports.

2.2 Topography and Hydrogeology

The surface topography slopes down to the east toward the Bronx River. Based on reports compiled by the U.S. Geological Survey (Central Park, NY - NJ Quadrangle), BRAC garden

construction plans and previous investigations summarized in Section 7.0, the property lies at an elevation of approximately 8 to 15 feet above the Bronx Highway Datum sloping to the east toward the Bronx River (approximately 15 feet to the east); the approximate depth to bedrock is between 26 and 45 feet below the surface; and the approximate depth to the water table is 10 to 14.5 feet. Groundwater would be expected to flow in a generally easterly direction toward the Bronx River. However, the actual groundwater flow direction may be influenced by tidal fluctuations, subsurface openings or obstructions such as basements, underground utilities, past filling activities, and other factors beyond the scope of this assessment. Groundwater in the Bronx is not used as a source of potable water (the municipal water supply uses upstate reservoirs).

The Property was not identified on computerized State or Federal wetlands maps; the Bronx River to the east was marked as a Riverine Wetland on the Federal National Wetlands Inventory map. Computerized Flood Insurance Rate Maps available on the New York City Department of Buildings website indicated that the Property is located within the 500-year flood zone and either adjacent to or partially within the 100-year flood zone. According to Ms. Nathan, the Bronx River flooded the building's basement several times in the past.

According to Mr. Koren, the adjacent DPR construction was conducted under a NYSDEC permit for construction adjacent to a wetland. The NYSDEC issued a jurisdictional determination in July 2010 for a proposed garden project in the rear of the property indicating that wetlands related permits were not required. A copy of the jurisdictional determination is provided in Appendix B.

2.3 Storage Tanks

2.3.1 Underground Storage Tanks (USTs)

A concrete-encased fuel oil storage tank was observed in the northern portion of the building's basement. The type of oil stored and the size of the tank could not be ascertained; however, based on the size of the enclosure, the tank was estimated to be approximately 1,500 gallons in size. Due to poor lighting in the boiler room and moisture from a leaking pipe on the boiler room floor, the bottom of the concrete encasement and the surrounding floor could not be inspected for evidence of staining. No odors were noted in the boiler room. The vent pipe and fill port for this tank were observed in the sidewalk on the western side of the building. Although the tank was located above ground, since it was encased in concrete and the exterior and bottom of this tank were not visible, current New York State regulations define this tank as an underground storage tank (UST). Regulatory records, computerized NYC Buildings Department databases and NYC Fire Department records did not identify any USTs on the property. Ms. Nathan was not aware whether tightness tests have been performed; no additional information about the tank was provided by HPD. Mr. Michael Davis of HPD was not aware of any tanks on the Property other than the observed heating oil tank, or of historical tank removals from the Property. According to construction plans provided by Ms. Stephani Resch of the New York City Department of Design and Construction (DDC), this tank would be removed as part of the proposed renovation.

Off-site USTs are discussed in Section 5.2.2.

2.3.2 Aboveground Storage Tanks (ASTs)

During the reconnaissance, a brick and concrete enclosure, approximately 15 feet by 15 feet wide and 4 feet high, was observed in the northern room. Ms. Nathan was not certain

of the function of the enclosure, but believed it may have contained a petroleum storage tank that may have been previously removed by HPD. However, as noted above, Mr. Michael Davis of HPD was not aware of any tanks on the Property other than the observed heating oil tank.

In addition to the enclosure in the garage, the 2007 Limited Phase II Subsurface Investigation conducted by LiRo Engineers (summarized in Section 7.0) noted a concrete pad in the southern portion of the basement as possible evidence of a historical AST. This concrete pad was not observed during the 2010 reconnaissance; the Phase II report may have been referring to one of the raised concrete pads observed in the basement, which appeared to be the tops of building footings rather than historical AST foundations.

No other evidence, such as tanks or vaults likely to contain tanks, vent pipes or fill caps was observed to indicate that petroleum ASTs are or were present. Regulatory records, computerized NYC Buildings Department databases and NYC Fire Department records did not identify any ASTs on the property. As noted, although the concrete-encased fuel oil storage tank in the basement was aboveground, under current NYSDEC regulations, it is considered a UST.

Off-site ASTs are discussed in Section 5.2.2.

2.4 Polychlorinated Biphenyls (PCBs)

Until 1979, polychlorinated biphenyls (PCBs), which provided beneficial insulating properties, were manufactured for use in a wide variety of products, primarily in electrical equipment such as transformers, capacitors, fluorescent light fixtures (especially ballasts), and voltage regulators, but also in hydraulic fluids and some other products, including caulk.

Based on the building's age, fluorescent lighting fixtures and electrical equipment observed in its interior and caulk may include PCB-containing components, including capacitors and potting compounds. No evidence of leaks or stains from the electrical equipment and lighting fixtures was observed.

2.5 Lead-Based Paint

Lead-based paint was generally not used inside residential buildings after 1960 in NYC or after 1977 nationwide. After 1977, its use inside the interiors of commercial structures was restricted and its use elsewhere became much less common, but lead-based paint may still be used outdoors. Lead-based paint can present a hazard, particularly to children and especially when it is in a deteriorating condition.

Based on the building's age, lead-based paint may be present. Painted surfaces in the occupied portions of the building were generally in good condition, although some surfaces in poor condition (chipped paint) were noted. Painted surfaces in the vacant former garage were in poor condition. At the time of the reconnaissance, portions of the building were used for art classes, including classes for children aged seven and older. The building did not include a child care center or other facility where the extended presence of young children (younger than seven years old) would be typical. No painted surfaces were noted in the rear courtyard area of the Property.

Activities (such as renovation or demolition) with the potential to disturb lead-based paint are subject to a variety of requirements, including US Occupational Safety and Health Administration regulation 29 CFR 1926.62 (Lead Exposure in Construction).

2.6 Utilities

The Property was connected to municipal water and sewer systems and supplied with electricity. According to Ms. Nathan and Mr. Koren, the building was historically connected to a natural gas line which was abandoned in the 1970s, and a new gas connection was to be constructed as part of the proposed building renovation. A 1970 Consolidated Edison utility plan provided by Mr. Koren showed the historical gas line beneath the former Bronx Street; the line was no longer shown on a similar 2010 plan.

2.7 Waste Management and Chemical Handling

According to Ms. Nathan, waste generated by BRAC consisted of general trash and recyclables, and was picked up by the New York City Department of Sanitation. According to Ms. Nathan, BRAC's children's classes used non-toxic water-based paints; most of the artists renting studios in the building used acrylic paints, and some used oil-based paints. According to Ms. Nathan, small amounts of excess oil paints and paint thinner were generally disposed of by wiping them with paper towels, which were placed in the trash. Small amounts of paint may also have been disposed of in the building's sinks. Paint staining was observed in a sink on the second floor.

Paints and cleaning and maintenance chemicals in containers up to five gallons in size were observed throughout the building. An approximately five-gallon can of kerosene (a solvent) was observed in a studio on the third floor. According to Ms. Nathan, several five-gallon cans of paint thinner were also stored in the artist studios. The containers were generally neatly stored and labeled and no staining or odors were noted in the storage areas. A steel oily waste container was observed under the fourth-floor sink. However, according to Ms. Nathan, this container was not used.

According to Ms. Nathan, pesticides were used in the building. However, pesticides were not stored on the Property and were applied as necessary by a pest control contractor.

2.8 Radon

Radon is a colorless, odorless gas most commonly produced by the radioactive decay of certain rocks. According to a New York State Department of Health database the average level of radon found in basements in the Bronx is 1.62 picocuries/liter, below the USEPA recommended action level of 4.0 picocuries/liter.

3.0 ASBESTOS-CONTAINING MATERIALS (ACM)

Asbestos is a name applied to a group of natural minerals, with particularly good fire resistant and insulation properties. In addition to insulation/fireproofing products, it is also commonly found in vinyl flooring, plaster, sheetrock, joint compound, ceiling tiles, roofing materials, gaskets, mastics, caulks and a range of other products. Materials containing more than one percent asbestos are considered asbestos-containing materials (ACM). ACM are classified as friable or non-friable: friable (e.g., most spray on fireproofing) ACM more readily release asbestos fibers than non-friable ACM (e.g., vinyl flooring and most roofing materials).

The reconnaissance was conducted by Ms. Asya Kleyn, a New York State-certified asbestos inspector. Visible suspect ACM were noted if they were observed. However, this reconnaissance was not intended to and may not have identified all visible suspect ACM. In addition, other suspect ACM may be present in areas not visible during the reconnaissance (e.g., areas not accessed or hidden behind walls, under flooring, above suspended ceilings, etc.). The observations made during the reconnaissance do not

constitute and cannot substitute for an asbestos survey, which is a comprehensive study with laboratory testing. Unless suspect ACM are known not to contain asbestos, prior to implementing an activity which could disturb known or suspect ACM (e.g., renovation or demolition), a NYC-certified asbestos investigator (NYS-certified asbestos inspector if outside of NYC) must inspect the areas and conduct testing, as necessary, to determine whether the activity would disturb ACM. Any such ACM must be removed prior to the activity. There are also requirements that all suspect ACM be maintained in good condition regardless of whether they are to be disturbed by a project in the building.

Suspect ACM observed during the reconnaissance included: wall and ceiling plaster, sheetrock, thermal pipe insulation, vinyl stair cover and mastic, 12-inch x 12-inch vinyl floor tiles and mastic, and roofing and flashing materials. According to Ms. Nathan, asbestos abatement was performed prior to the roof being entirely replaced in the early 2000s; however, no records of the abatement were available. Ms. Nathan indicated that past renovation activities by HPD were limited to bathroom renovation on the second and third floors. Ms. Stephani Resch of the New York City Department of Design and Construction (DDC) believed that the building had been surveyed for asbestos; however, the survey findings were not provided to AKRF for review. Damaged thermal pipe insulation was observed in the former garage on the ground floor.

4.0 ADJACENT LAND USE

The DPR Bronx River Park Restoration project was north and east-adjacent to the Property, and construction associated with this project was in progress at the time of the reconnaissance. The former Bronx Street west-adjacent to the Property had been demapped and converted to a construction entrance to the DPR area and the rear courtyard area of the Property. A construction shed was located on the former Bronx Street. Stockpiles of tires, hay bales, boulders, soil and gravel were located north of the Property on the DPR site. Erosion and sediment control measures (such as silt fencing and geotextile bank stabilization) were noted east-adjacent to the Property along the banks of the Bronx River.

The surrounding area consisted of low and mid-rise commercial buildings and residential buildings, many with ground-floor commercial uses. A school was located to the southwest across East Tremont Avenue. A commercial and institutional building with a multi-story parking garage was located west of the Property across the former Bronx Street. The Bronx River flowed north to south to the east of the Property, separated from the Property by a strip of land owned by DPR. A bridge crossed the river southeast of the Property on East Tremont Avenue. Elevated subway tracks ran above Boston Road one block west of the Property, curving east toward East 179th Street one block north of the Property.

5.0 PROPERTY HISTORY AND RECORDS REVIEW

5.1 Prior Ownership and Usage

5.1.1 Historical Land Use maps

Historical insurance maps were reviewed for indications of uses (or other evidence) suggesting hazardous materials generation, usage or disposal on or near the property. Specifically, Sanborn Fire Insurance Maps from 1901, 1915, 1951, 1977, 1989 and 2006 were reviewed. Copies of the maps are provided in Appendix C.

1901

The Property was occupied by small two-story buildings of unspecified use and vacant land.

The surrounding area was developed predominantly with low-rise buildings with unspecified uses, as well as some churches. The southern portion of the block to the south was occupied by the Bronx Company, a cotton goods bleacher, dyer and printer. The Bronx River flowed toward the south directly east of the project block. A bridge crossed the river along East 177th Street (future East Tremont Avenue).

1915

The Property was occupied by a small two-story commercial and office building and vacant land.

A rail yard and an inspection shed for the Interboro Rapid Transit Company were north-adjacent to the Property. The bridge to the southeast appeared to have been rebuilt or widened. The surrounding area was occupied by commercial, residential, institutional, and manufacturing uses, with several manufacturing properties north of the Property on the banks of the Bronx River, including Metropolitan Dye Works Dyeing and Cleaning, a rug and mat manufacturer and a steel door and sash manufacturer.

1951

The Property was occupied by the existing four-story building with a basement in its southern portion, and a north-adjacent one-story store. The northern portion of the four-story building contained a store, light manufacturing, and auto body repair. The building's southern portion was occupied by a store, manufacturing, and auto sales.

A portion of the rail yard noted north-adjacent to the Property in 1915 was no longer shown. More auto-related uses (including garages with buried gasoline tanks) were noted in the surrounding area. A filling station, an auto service station, and a fireproof door factory were located on the block west of the Property. The bleaching, dyeing and printing company shown on the block to the south in 1915 had been demolished and replaced by vacant land and several small buildings, including a dry cleaner southwest of the Property.

1977

Neither the Property buildings nor west-adjacent Bronx Street were shown on the map, although according to Ms. Nathan, both buildings were present at this time.

Most buildings shown on blocks to the north and west in 1951 had been demolished and replaced with multistory housing developments. A large shopping center with a parking garage occupied the block to the west, which appeared to have been merged with the project block. An elevated train line was shown one block west of the Property on Boston Street and turned east on East 179th Street. Buildings shown on the block to the south in 1951 had been demolished and replaced by a school.

1989

No significant changes from the 1977 map were noted. Similar to the 1977 map, the 1989 map did not show the Property building.

2006

No significant changes from the 1989 map were noted. Similarly to the 1989 map, the 2006 map did not show the Property building.

To summarize, historical Sanborn maps indicated that the Property was partially developed with small buildings prior to 1901. The existing building was constructed by 1951 and included commercial, auto sales, auto repair and manufacturing uses. The northern portion of the Property was occupied by a one-story store by 1951. Although the Property appeared to be vacant on the 1977 and subsequent maps, interviews, NYC Buildings Department records and City Directory records indicated that the buildings remained on the Property until approximately 2000 (the one-story building) and the present (the four-story building).

The surrounding area was historically mixed-use. A rail yard was historically north-adjacent to the Property, and manufacturing uses including a dyer and cleaner, a rug and mat manufacturer, and a steel door and sash manufacturer were located further north on the banks of the Bronx River. The block to the south was historically occupied by a cotton bleaching, dyeing and printing company, and a dry cleaner was later located in the northwestern corner of this block. The block to the west historically included a filling station, auto repair, and fireproof door manufacturing.

5.1.2 Historical Aerial Photographs

Since historical fire insurance maps were available for the Property (and surrounding area) and these maps included information relating to land use, aerial photographs would, most likely, not provide additional useful information relevant to the potential for recognized environmental conditions or other environmental concerns. As such, aerial photographs were not reviewed.

5.1.3 Property Tax Files and Zoning Records

Based on NYC Department of City Planning's Primary Land Use Tax Output (PLUTO) information provided by Toxics Targeting, Inc. of Ithaca, New York, the tax lot including the Property is zoned R7-1 (general residence). The tax information indicated that two buildings were present on the lot, and were classified Z9 (miscellaneous) and listed as built in 1931. However, only one building was observed on the Property at the time of the reconnaissance; according to historical Sanborn maps, this building was built between 1915 and 1951. Ms. Nathan indicated that the second building historically present on the Property was demolished in approximately 2000.

5.1.4 Recorded Land Title Records

Copies of title records were not provided to AKRF for review. A review of computerized New York City Automated City Register Information System (ACRIS) records, which included records of financial transactions involving the Property, identified the Property tax block and lot in a court order listing properties to be condemned by New York City in 1969. ACRIS records identified no environmental liens or use restrictions on the Property.

5.1.5 Local Street Directories

A City Directory prepared by Environmental Data Resource, Inc. was reviewed. The City Directory consisted of the names of businesses located on-site and in adjacent properties,

compiled from city and telephone directories and listed at approximately five to ten-year intervals starting with 1927. The Directory identified the following historical uses of the Property: offices, plastering and fireproofing contractors, Tremont Dress Co. (a dress store or manufacturer), and two thermometer companies (Bernstein C Thermometers and Philbern Thermometer Co.) in 1927; Tremont Dress Co., Bernstein C Thermometers and Philbern Thermometer Co. in 1940; a washing machine service company and wholesale washing machine parts sales in 1961; wholesale washing machine parts sales in 1965; and Feco Products and Frankson Exterminating Co. (which may have used pesticides) in 1976. No newer Directory records were available for the Property; however, information on Property uses from the 1970s onward was provided by Ms. Nathan and is summarized in Section 2.1. The Directory identified historical uses at addresses near the Property on East Tremont Avenue as commercial and residential, with auto-related uses two blocks to the west.

5.2 Regulatory Review

Regulatory database information, as shown in Appendix D, was obtained from Toxics Targeting, Inc. of Ithaca, New York. The Introduction of Appendix D includes summaries of the databases searched, their radii around the property and limitations of the data. The databases searched and associated radii were consistent with ASTM E1527-05.

5.2.1 Federal

The federal databases searched included the National Priority List (NPL); Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS); Emergency Response Notification System (ERNS); Toxic Chemical Release Inventory System (TRIS); the Permit Compliance System of Toxic Wastewater Discharges (WWD); the Air Discharge Facilities Index (ADF); and the USEPA Civil Enforcement Docket. The federal listing of facilities which are subject to corrective action under the Resource Conservation and Recovery Act (CORRACTS) is discussed with the State databases of RCRA listings.

National Priority List (NPL)

The NPL is the USEPA's compilation of some sites that probably remedial action under the Superfund Program. NPL sites can pose a significant risk of stigmatizing surrounding properties and thus impacting property values.

No NPL sites were identified within a one-mile radius of the Property.

Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS)

CERCLIS is a compilation of sites which the USEPA has investigated, or plans to investigate, pursuant to the Superfund Act of 1980 (CERCLA). As such, some of these sites may ultimately present concerns and others may not (but could still pose a perceived threat, thus affecting property values).

No CERCLIS sites were identified within a 1/2-mile radius of the Property.

Emergency Response Notification System (ERNS)

This federal database, compiled by the Emergency Response Notification System, records and stores information on certain reported releases of petroleum and other potentially hazardous substances.

The database identified two ERNS records as potentially located on-site, as follows:

- In July 1998, a release of PCB-containing transformer oil into the municipal sewer system occurred from Consolidated Edison transformer vault #4032 on the "west side of Tremont Avenue". Since Tremont Avenue runs east-west, this listing may have pertained to West Tremont Avenue, approximately 1.5 miles northwest of the Property. No transformer vaults were noted on or adjacent to the Property during the reconnaissance.
- In August 1999, a caller reported an ethylene glycol (antifreeze) sheen on the Bronx River to the Coast Guard. However, the sheen could not be located and no further information was provided in the listing.

Based on the listing details, the above releases did not appear to have occurred on the Property. Although the ethylene glycol spill may have occurred in the vicinity of the Property, no evidence of an antifreeze release (sheen, odor and/or stained soil) was noted on the banks of the Bronx River near the Property during the reconnaissance.

Toxic Chemical Release Inventory System (TRIS)

The TRIS contains information reported by a variety of industries on their annual estimated releases of certain chemicals.

No TRIS sites were identified within a 1/8-mile radius of the Property.

Permit Compliance System of Toxic Wastewater Discharge (WWD)

This database includes certain sites which discharge wastewater containing potentially hazardous chemicals.

No WWD facilities were reported within a 1/8-mile radius of the Property.

United States Environmental Protection Agency Civil Enforcement Docket

This database tracks civil judiciary cases filed on behalf of the USEPA by the Department of Justice.

No facilities were listed in the USEPA's Civil Enforcement Docket within a 1/8-mile radius of the Property.

Air Discharge Facilities Index (ADF)

This federal database includes information on certain air emission sources.

Two Air Discharge Facilities were identified within a 1/8-mile radius of the Property as follows:

- Boston Cleaners, located at 2040 Boston Road, approximately 185 feet west-northwest of the Property, was listed with potential emissions of less than 100 tons of tetrachloroethylene a year.

- The United States Postal Service – West Farms Station, located at 362 Devoe Avenue, approximately 405 feet southeast of the Property, was listed for potential emissions of less than 100 tons of an unspecified “default pollutant” a year.

Both identified ADF facilities were reportedly in compliance with the applicable regulations. Based on the anticipated groundwater flow direction, Boston Cleaners may have affected subsurface conditions beneath the Property. However, no solvents were identified in groundwater samples collected during a 2007 Limited Subsurface Investigation conducted by LiRo Engineers, Inc. (summarized in Section 7.0).

5.2.2 State

The state records reviewed included the listings of hazardous material spills (SPILLS); Resource Conservation and Recovery Act Notifiers (RCRA); Chemical Bulk Storage (CBS); Solid Waste Facilities (SWF); Petroleum Bulk Storage (PBS); State Inactive Hazardous Waste Disposal Sites (SHWS); Major Oil Storage Facilities (MOSF); Brownfield Sites; and Historic Utility Sites.

New York SPILLS Database

This database includes releases reported to the NYSDEC, including tank test failures (for USTs only) and tank failures.

One reported spill potentially originated on or adjacent to the Property. In October 2001, a spill of raw sewage was reported coming from the ground in the vicinity of 1087 East Tremont Avenue and entering the Bronx River. In July 2003, NYSDEC records noted that the spill was no longer visible on the river, and the listing was closed. Three other closed spills of raw sewage or unknown green material to the river near the intersection with East Tremont Avenue were reported in April 2004, July 2004, and January 2007. Two of these spills were traced to a sewer outfall pipe, and all of the listings were closed. Additionally, a spill of white foam to the river from Quality Mill Work Corp., located at 425 Devoe Avenue (approximately 435 feet to the northeast across the river), was reported in November 2000 and closed in January 2003. No evidence of past or present contaminated discharges to the river was noted on or near the Property during the reconnaissance.

In addition to the above spills, one hundred eighty-five spills were reported within a ½-mile radius of the Property, including 8 active status spills and 177 closed status spills. Spill listings with the potential to affect the site based on listing details and/or presumed upgradient groundwater flow direction are summarized below:

- On May 8, 1996, a spill of an unknown quantity of petroleum into a sewer in a basement was reported at One West Farms Square, approximately 780 feet to the west-northwest. The NYC Fire Department had responded to the scene. No further information was provided, and the listing was closed on May 9, 1996.
- A caller reported that black petroleum product was coming from the ground at 935 East 178th Street, approximately 1400 feet west-northwest of the Property, in July 1998. No further information was provided. The listing was closed in December 2003.
- Two No. 2 fuel oil tank test failures involving high volume leaks and impact to groundwater were reported at 1900 Crotona Parkway, approximately 1980 feet west

of the Property. The first failure was reported in November 1987. The tank was removed in August 1988, and the spill was closed in November 1993. The second failure, for a No. 4 fuel oil storage tank, was also reported in November 1987 and closed in November 1993. No further information was provided.

Based on their closed status and distance from the Property, the above listings are not likely to have affected the Property. Other identified spill listings are also unlikely to have affected the Property based on listing details, distance and/or the anticipated groundwater flow direction. Additionally, a groundwater sample collected from a monitoring well upgradient of the Property during the 2007 Limited Subsurface Investigation by LiRo Engineers, Inc. did not identify impacts to groundwater beneath the Property from upgradient sources. Details for all listed spills are included in Appendix D.

Resource Conservation and Recovery Act (RCRA) Notifiers Listings

This database lists sites which have filed notification forms regarding hazardous waste activity, including: treatment, storage and disposal facilities (TSDs); small-quantity (SQG) and large-quantity generators (LQG); and transporters regulated under RCRA. The discussion below includes any CORRACTS listings of facilities which are subject to corrective action under RCRA.

No CORRACTS listings were identified within a one-mile radius of the Property, and no TSD facilities were identified within a ½-mile radius of the Property. Eight RCRA Generators/Transporters were reported within a ¼-mile radius of the Property. Details of the nearest facilities are as follows:

- Consolidated Edison Manhole 404, located at Bronx Street and East Tremont Avenue, approximately 185 feet southwest of the Property, was listed as a generator of PCB-contaminated solids in 2005. No electrical manholes were noted on or adjacent to the Property during the reconnaissance.
- Boston Cleaners, located at 2040 Boston Road, approximately 195 feet west-northwest of the Property, was listed as a Conditionally Exempt Small Quantity Generator of spent halogenated solvents in 1991. A RCRA violation pertaining to generator manifest requirements was noted in 1993. No date of return to compliance was given, but the violation was noted to have been removed or significantly modified by USEPA.
- The Metropolitan Transportation Authority – New York City Transit East 178th Street Yard, located at East 178th Street and Boston Post Road, approximately 360 feet west-northwest of the Property, was identified as a generator of lead waste in 2002.

Based on distance and anticipated groundwater flow direction, potential discharges from Boston Cleaners, Inc. could affect groundwater beneath the Property. However, no solvents were identified in groundwater samples during the 2007 Limited Subsurface Investigation by LiRo Engineers, Inc. and migration of associated vapors into groundwater beneath the site is therefore unlikely. Based on the nature of the listings, distance, and/or the anticipated groundwater flow direction, the other RCRA facilities are not expected to have affected the Property.

Chemical Bulk Storage (CBS) Database

The New York CBS is a list of facilities that store regulated non-petroleum substances in aboveground tanks with capacities greater than 185 gallons and/or in underground tanks of any size.

No CBS facilities are listed within a 1/8-mile radius of the Property.

Solid Waste Facilities (SWF)

This database includes certain landfills, incinerators, transfer stations, recycling centers, and other sites which manage solid waste.

One Solid Waste Facility was identified within a 1/2-mile radius of the Property. Delma Construction Co. Inc., located at 1208 Wyatt Street, approximately 1,265 feet southeast of the Property, was identified as a construction and demolition (C&D) debris processing facility handling concrete, asphalt, brick, soil and rock. Based on its distance and anticipated cross-gradient groundwater flow direction from the Property, this facility is not expected to have affected subsurface conditions at the Property.

Petroleum Bulk Storage (PBS) Database

This database lists facilities that registered having either aboveground or underground petroleum tanks with total storage exceeding 1,100 gallons. Facilities with more than 400,000 gallons appear on the Major Oil Storage Facilities (MOSF) database (see below).

Eight PBS facilities were identified within a 1/8-mile radius of the Property. Six of these facilities were separated from the Property by the intervening Bronx River, and are thus not likely to have affected subsurface conditions at the Property. Details of the remaining two facilities are given in Table 1.

Table 1
Area Petroleum Bulk Storage Facility Data

Location	Capacity (gallons)	Product Stored	Status	Distance/Direction from Property
Murphy Houses 1010 East 178 th Street	15,000 UST 8,000 UST	No. 2 Fuel Oil	Closed-Removed In Service	590 feet / west-northwest
Intermediate School 167 1970 West Farms Road	10,000 AST x2	No. 6 Fuel Oil	In Service	645 feet / southwest

Notes: AST - aboveground storage tank
UST - underground storage tank

Four closed-status spills were reported for Murphy Houses, and one closed-status spill was reported at Intermediate School 167. These spills were not expected to have affected the Property based on listing details and/or the anticipated groundwater flow direction. Although potential undetected releases from Murphy Houses may impact groundwater beneath the Property, as noted previously, the Limited Subsurface Investigation by LiRo Engineers, Inc. in 2007 did not identify impacts to groundwater beneath the Property from upgradient sources. Details of the identified PBS facilities are included in Appendix D.

State Inactive Hazardous Waste Disposal Site Registry (SHWS)

This program (also known as State Superfund) lists information regarding a variety of sites likely requiring cleanup.

No SHWS sites were reported within a one-mile radius of the Property.

State Hazardous Substance Waste Disposal Site Study (SHSWDS)

This database tracks certain sites that were not listed on SHWS, but may still require investigation and/or cleanup.

No SHSWDSs were identified within a ½-mile radius of the Property.

Major Oil Storage Facilities (MOSF) Database

These facilities have petroleum storage of 400,000 gallons or more.

No Major Oil Storage Facilities were reported within a ¼-mile radius of the Property.

Environmental Restoration Program

These sites (which are generally municipally-owned) are receiving New York State funding for site investigation and remediation. Some sites in this program have known contamination, whereas others have not had sufficient investigation to determine whether contamination is present.

No ERP sites were identified within a ½-mile radius of the Property.

Voluntary Cleanup Program

The Voluntary Cleanup Program is a NYSDEC program for investigation and remediation of (generally) privately-owned sites. Some sites in this program have known contamination, whereas others have not had sufficient investigation to determine whether contamination is present.

One VCP site was identified within a ½-mile radius of the Property. Consolidated Edison – East 173rd Street Works, located at West Farms Road on the Bronx River, approximately 2,600 feet south-southwest of the Property, is not expected to have affected the Property based on its distance and downgradient location with respect to the anticipated groundwater flow direction.

Brownfield Cleanup Program

This NYSDEC program is the successor to the Voluntary Cleanup Program. Again, some sites have known contamination, whereas others have not had sufficient investigation to determine whether contamination is present.

One BCP site was identified within a ½-mile radius of the Property. 1800 Southern Boulevard, located approximately 2,520 feet west-southwest from the Property, was a former filling station and auto repair shop with petroleum-contaminated soil, groundwater, and soil vapor. Contaminants included methyl tert-butyl ether or MTBE, a gasoline additive. At the time of the listing, the site was under investigation. An active-status spill had also been reported at this site in March 2003. Based on this site's distance and anticipated cross-gradient location with respect to groundwater flow, 1800 Southern Boulevard is not likely to have affected groundwater conditions beneath the Property.

Historic Utility Sites

This is an inventory of certain power generating stations, manufactured gas plants, gas storage facilities, maintenance yards and other gas and electric utility sites identified in various historic documents, maps and annual reports from 1898 to 1950.

No historical utilities were reported within a 1/8 mile of the Property.

5.2.3 Local

Records available online from the New York City Fire and Buildings Departments were viewed for the Property. The Fire Department records were obtained by Toxics Targeting, Inc. as part of the regulatory database search. Since the records typically address a multitude of issues, the review focused on items likely to relate to the potential presence of hazardous materials, e.g., petroleum tank installation applications and permits, and records indicating prior uses. Copies of pertinent information are included in Appendices D (Fire Department Records) and E (Buildings Department Records).

Buildings Department

Computerized Buildings Department records identified the following:

- Seven New Building Permits (five undated, two dated 1951).
- A 1991 application to replace a boiler and burner.
- A complaint regarding a vacant, open, and unguarded garage, and a Buildings Department violation pertaining to the same garage, both dated 2000. The violation was dismissed since the garage had been demolished.
- Two 2001 complaints regarding leaking roofs in the building.
- A 2001 application to install a new floor drain in the building's basement; this application identified the building as containing "residential apartments" and may have been erroneously filed under the Property address.
- A 2007 complaint regarding a car dealership on Bronx Street; the record noted that the address of the dealership was not specified, and based on the interview with Ms. Nathan, no dealership was located on the Property in 2007.
- A 2010 application to renovate the building, install an elevator pit and modify interior partitions.

Dismissed and active structural and boiler violations were listed for this address; however, there was no information to indicate that any of these violations pertained to environmental conditions on the Property. Two listings for Certificates of Occupancy were identified; however, the Certificates themselves were not available in the Building Department records. No other information pertinent to environmental conditions on-site was identified.

A 1931 Certificate of Occupancy provided by Ms. Resch identified a four-story office, auto repair and manufacturing building with a factory on floors two through four (likely the existing building) on the Property.

Fire Department

The New York City Fire Department Tanks database was searched regarding past or current motor vehicle fuel and heating oil tank listings for the Property and sites within a 1/8-mile radius. Computerized NYC Fire Department records identified two tank

registrations within a 1/8-mile radius of the Property. Both of the identified addresses were separated from the Property by the intervening Bronx River, and are thus not likely to have affected subsurface conditions at the Property.

5.2.4 Additional Environmental Record Sources

To enhance the search, ASTM requires that additional local records be checked when, in judgment of the environmental professional, such records are: 1) reasonably ascertainable; 2) useful, accurate and complete in light of the objective of the records review; and 3) are obtained in initial ESAs. These records include:

- Local Brownfields Lists
- Local Lists of Landfill/solid waste disposal sites
- Local Lists of Hazardous Waste/Contaminated Sites
- Local Lists of Registered Tanks
- Local Land Records (for activity use limitations)
- Records of emergency release reports
- Records of contaminated public wells

Sources for these records include:

- Department of Health/Environmental Division
- Fire Department
- Building Permit/Inspection Department
- Local/Regional Pollution Control Agency
- Local/Regional Water Quality Agency
- Local Electric Utility (for PCB records)

In AKRF's judgment, no such additional local records meeting the ASTM criteria are pertinent for the property.

6.0 USER-PROVIDED INFORMATION

In addition to Ms. Nathan and Mr. Koren, who accompanied AKRF during portions of the reconnaissance and answered pertinent questions, AKRF also contacted the following: Ms. Stephani Resch of DDC, Ms. Laurie Schoeman (BRAC's Owner's Representative) and Ms. Julia McCarty of Sage and Coombe Architects (the project architect). Ms. Schoeman contacted Mr. Michael Davis of HPD for additional information. The following information was provided:

- The Property is owned by the HPD and leased by BRAC.
- Ms. Nathan indicated that the Phase I ESA was performed as part of due diligence prior to the transfer of the Property from HPD to BRAC ownership, renovation of the current building, and construction of a garden in the northern portion of the Property. According to construction and renovation plans, the proposed project would entail renovation of the Property building, filling the existing partial basement (except for the future elevator pit) and limited excavation north and west of the building for

utility installation, footings for an egress part from the building, and garden construction. The renovation would involve the removal of the existing fuel oil tank (to be replaced by a rooftop heating, ventilation and air conditioning system), replacement of the roof membrane and most interior building materials, and installation of new interior partitions.

- According to Ms. Schoeman, the Property was acquired by HPD in approximately 1970, and HPD was not aware of the history of the Property prior to acquisition.
- Neither Ms. Nathan, Mr. Koren, nor Mr. Davis (who was interviewed by Ms. Schoeman) were aware of: any wells on or near the Property; any spills of petroleum or hazardous materials on the Property; any pending, threatened, ongoing or past hazardous substances/petroleum litigation/enforcement action/consent order/notice of violation relevant to hazardous substances or petroleum products; any environmental liens or activity use limitations on the Property; or any property value reduction due to environmental issues.

To the extent that pertinent additional information was provided, it has been summarized elsewhere in this report.

7.0 PREVIOUS STUDIES

Geotechnical Investigation, Contract X288-102M – Reconstruction of Bronx River Park; Langan Engineering & Environmental Services (Langan), December 2005

The December 2005 geotechnical investigation report encompassed the Bronx River Park reconstruction area, including land north and east-adjacent to the Property. Two test pits were excavated east-adjacent to the Property building to assess the type and condition of the building's foundation. Three soil borings and three test pits were located north of the Property. The report indicated that the building's foundations consist of stacked stone blocks extending approximately 7 feet below grade. Soils encountered in the borings and test pits consisted of fill materials (sand mixed with rock fragments, brick, steel, trash, roots and organic matter) to depths of approximately 6 to 12 feet below grade, generally underlain by sand mixed with gravel and silt. In the test pits east-adjacent to the Property, the fill material was underlain by silty clay approximately six feet below grade, and groundwater was encountered approximately seven feet below grade. The report also indicated that the Property elevation ranges from approximately 17.5 to 10.5 feet above the National Geodetic Vertical Datum (NGVD), an approximation of mean sea level, sloping down to the east toward the Bronx River.

Limited Phase II Environmental Site Investigation (ESI) for the Bronx River Arts Center; LiRo Engineers, Inc. (LiRo), September 2007

The Phase II report noted that no Phase I ESA was conducted prior to the investigation. The Limited Phase II ESI was conducted to identify the source of a petroleum odor observed in one boring during a geotechnical investigation conducted by Matrix Engineering Services, P.C. (Matrix) in February 2007. This boring was advanced on the Property in the rear courtyard area. A copy of the 2007 geotechnical report was not provided to AKRF for review. The Limited Phase II consisted of the advancement of 11 soil borings and the collection of 11 soil samples and two groundwater samples for laboratory analysis for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and metals.

The borings in the rear courtyard area were advanced to a maximum depth of approximately 19 feet below grade and samples were collected for laboratory analysis from intervals ranging from 10.5-11 feet to 16.5-17 feet below grade. Due to access limitations, the indoor borings were advanced to approximately six feet below garage or basement floor grade and samples were collected from the interval

of 5-5.5 feet below floor grade. Evidence of petroleum contamination [an elevated photoionization detector (PID) reading] was noted in soil boring SB-9, advanced in the southwestern portion of the rear courtyard area near the location of the 2007 geotechnical boring where contamination was first noted. Trace concentrations of VOCs, including those associated with petroleum use, were detected in the soil borings, particularly SB-9. However, only acetone, a common laboratory contaminant, exceeded its NYSDEC Part 375 Soil Cleanup Objective (SCO) for Unrestricted Use (but not its SCO for Commercial Use) in two soil samples collected beneath the former garage. Acetone is a common laboratory contaminant and was not considered a contaminant of concern. SVOCs commonly associated with urban fill exceeded their respective Unrestricted Use SCOs in boring SS-6 beneath the former garage, and several metals exceeded their respective Unrestricted Use SCOs and/or Eastern USA Background Levels in one or more soil samples. Only lead exceeded its Commercial Use SCO in one sample, SS-6. The elevated concentrations of SVOCs and metals are typical of urban fill. Soil sample SS-6 contained lead at a concentration of 2,100 parts per million (ppm). Samples SS-2, SS-5 and SB-11 contained mercury at concentrations of 2.8, 3.8 and 2.3 ppm respectively.

The groundwater samples were collected from boring SB-9 and from a monitoring well installed during the 2007 geotechnical investigation in the Bronx Street sidewalk west (potentially upgradient) of the Property. The monitoring well was not observed during reconnaissance for the 2010 Phase I ESA, but may remain beneath the construction shed west-adjacent to the Property. No VOCs other than a trace concentration of acetone were detected in the monitoring well sample. The groundwater sample from SB-9 contained several petroleum-related VOCs in exceedance of NYSDEC Class GA standards (drinking water standards). Several SVOCs and metals also exceeded their respective Class GA standards in both groundwater samples, possibly due to suspended sediment particles in the samples.

The Phase II report noted that the groundwater contamination detected at the site may be attributable to historical auto repair on-site. Although no evidence of contamination was noted in the indoor soil borings, including a boring in the vicinity of the on-site fuel tank, elevated PID readings in boring SB-9 were observed more than six feet below grade.

8.0 LIMITATIONS AND DATA GAPS

This assessment met the requirements of the American Society for Testing and Materials (ASTM) as established by ASTM Standard E1527-05 at the time it was performed, with the following limitations:

- Results of this investigation are valid as of the dates on which the investigation was performed.
- Only representative studios were toured during the reconnaissance. At the time of the reconnaissance, most studios were locked and inaccessible.
- Portions of the building floors were obscured by stored materials or debris, and were not inspected for staining, presence of wells or catch basins, or other features.
- The ground-floor garage and portions of the basement were poorly lighted, and were observed by flashlight. The tank in the basement was encased in concrete and could not be observed directly. Additionally, the floor of the boiler room could not be inspected for evidence of petroleum staining due to being discolored throughout the boiler room by water from a leaking pipe.
- Interviews and user provided information were limited to those discussed in Section 6.0. To the extent that interviews were not conducted with the list of interviewees cited in the ASTM Standard (past and present owners, operators, and occupants of the property and local government officials), AKRF does

not believe that this represents a significant data gap likely to result in additional or significantly changed recognized environmental conditions or conclusions.

- The project site area history was not conducted in five-year intervals. However, sufficient information about the history of the site and surrounding area could be obtained from the available historical Sanborn maps, City Directory records, and interviews, and this data gap is not likely to alter the conclusions of this report.

9.0 CONCLUSIONS AND RECOMMENDATIONS

This Phase I Environmental Site Assessment was performed in conformance with ASTM Standard E1527-05, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Practice*. Any exceptions to, or deletions from, this practice are described in Section 8.0. The term "Recognized Environmental Condition" means the presence or likely presence of hazardous substances or petroleum at the property, including the ground, groundwater, or surface water at or under the property.

At the time of AKRF's reconnaissance, the property's approximately 8,300-square foot (sf) area included the four-story (plus partial basement) art center, occupying an approximately 4,500-sf footprint and a vacant, rear courtyard area. The surrounding area was occupied by residential, commercial and institutional properties and parkland.

This assessment revealed evidence of Recognized Environmental Conditions, as described in the first four bullets, and additional findings, as follows:

- A Limited Phase II Environmental Site Investigation conducted by LiRo Engineers, Inc. in September 2007 identified petroleum-related volatile organic compounds (VOCs) in a groundwater sample collected from the southwestern portion of the rear courtyard area. Evidence of VOC contamination was noted in the soil boring from which the sample was collected. No VOCs were detected in a second groundwater sample, collected on the western edge of the site (potentially upgradient with respect to groundwater flow). Trace concentrations of VOCs, including those related to petroleum use, were also identified in the soil samples. The detected VOCs may be attributable to historical auto repair uses on-site.

The Phase II also noted elevated concentrations of metals and semi-volatile organic compounds (SVOCs) in soil and groundwater, which may be attributable to the presence of urban fill beneath the Property. One soil sample (SS-6) contained lead at a concentration of 2,100 parts per million (ppm), which could be classified as hazardous waste; however, additional testing using the Toxicity Characteristic Leaching Procedure (TCLP) would be necessary to characterize the material. Elevated concentrations of mercury were detected in several of the soil samples. Based on the historical use of the Property for mercury thermometer manufacturing, additional testing, inclusive of shallow soil sampling, would be necessary to determine if the elevated mercury concentrations are attributable to historic use of the site or only related to urban fill.

Due to access limitations during the Phase II investigation, soil borings inside the building were advanced to six feet below grade. Although no evidence of contamination was noted in the indoor soil borings, such evidence was noted more than six feet below grade in the rear courtyard area and it is possible that contaminated soil and/or groundwater are also present in the former garage area more than six feet below grade (below soil sampling depth).

- One vaulted, concrete-encased fuel oil storage tank, approximately 1,500 gallons in size, was noted in the basement during the reconnaissance. Although the tank was aboveground, since the tank was encased in concrete and its exterior and bottom were not visible, current New York State regulations define this tank as an underground storage tank (UST). No NYSDEC or New York City Fire Department registrations for this tank were identified in regulatory databases. BRAC and New York City Department of Housing Preservation and Development (HPD) representatives were not aware of the tank size, type of fuel oil used by the tank, or whether the tank had been tested for tightness. Potential releases from the tank could have affected soil and/or groundwater beneath the Property.

- Historical land use maps and Buildings department records identified historical auto repair, auto sales and unspecified industrial use of the building. City Directory records identified the use of the property by two thermometer companies on the Property in 1927 and 1940. The C of O for 1931 referenced use of the 2nd through 4th floors of the building as an unspecified factory, which may have been associated with manufacturing by the thermometer companies and the use of mercury. Additionally, the City Directory noted that an exterminating company (which may have used pesticides) existed on the Property in 1976. The surrounding area was historically mixed-use and included a north-adjacent rail yard, a dyer and cleaner to the north on the Bronx River, a cotton bleaching, dyeing and printing company and dry cleaning on the block to the south, and a filling station, auto repair and fireproof door manufacturing on the block to the west. A dry cleaner was identified on the block to the west in regulatory databases. Although the off-site uses may have affected groundwater beneath the Property, as noted above, no such impacts were noted in the upgradient groundwater sample collected during the 2007 Phase II investigation. Historical on-site and off-site uses of the Property may have resulted in releases of hazardous substances to the building interior as well as soil and/or groundwater.
- Paints and cleaning and maintenance chemicals in containers up to five gallons in size were observed throughout the building. Paint thinner and kerosene (a solvent) in approximately five-gallon containers were stored in some artists' studios, according to Ms. Nathan. According to Ms. Nathan, BRAC's children's classes used non-toxic water-based paints, most artists renting studios in the building used acrylic paints, and some used oil paints. According to Ms. Nathan, small amounts of excess oil paints and paint thinner were generally disposed of by wiping them with paper towels, which were placed in the trash. Small amounts of paint may also have been disposed of in the building's sinks. Paint staining was observed in a sink on the second floor. The containers were generally neatly stored and labeled and no staining or odors were noted in the storage areas. However, historical staining was noted on the floor of the former garage space.
- According to Ms. Nathan, pesticides were used in the building. However, pesticides were not stored on the Property and were applied as necessary by a pest control contractor.
- According to Ms. Nathan, rain-soaked insulation was installed under the building roof during past roof replacements, and mold may be present in the insulation.
- Based on the age of the Property building, asbestos-containing materials (ACM) may be present in the structure. According to Ms. Gail Nathan of BRAC, asbestos abatement had been conducted on the building's roof in the early 2000s and according to Ms. Stephani Resch of the New York City Department of Design and Construction (DDC), the building had been surveyed for asbestos. However, no documentation of the abatement and survey was provided to AKRF. Suspect ACM observed during the reconnaissance included: wall and ceiling plaster, sheetrock, thermal pipe insulation, vinyl stair cover and mastic, 12-inch x 12-inch vinyl floor tiles and mastic, and roofing and flashing materials. Thermal pipe insulation in the former garage on the ground floor was noted to be damaged. No suspect ACM were noted in the rear courtyard area.
- Based on the building's age, lead-based paint may be present. Painted surfaces in the occupied portions of the building were generally in good condition, although some surfaces in poor condition (chipped paint) were noted. Painted surfaces in the vacant former garage were in poor condition. At the time of the reconnaissance, portions of the building were used for art classes, including classes for children aged seven and older. The building did not include a child care center or other facility where the extended presence of young children younger than seven years old would be typical. No painted surfaces were noted in the rear courtyard area of the Property .

- Fluorescent lights and electrical equipment may include components (e.g., capacitors and potting compounds) containing polychlorinated biphenyls (PCBs) and/or mercury. Unless fluorescent lighting fixtures, electrical equipment and hydraulic elevator equipment are in damaged condition, they do not present a potential hazard to human health.

RECOMMENDATIONS

- Since historical uses inside the building may have included thermometer manufacturing, AKRF recommends a mercury vapor survey of indoor air in the building, sampling of interior building materials and piping, surface (wipe) sampling, and shallow soil testing to supplement the Limited Phase II investigation to determine whether the historical use of the Property as a mercury thermometer manufacturer has affected the Property.
- The proposed renovation would involve excavation adjacent to, but not beneath, the Property building. The proposed renovation would also include filling of the basement and repair of the ground level floor slab, which would reduce the risk of potential vapor intrusion into the building. If no activities are planned that would disturb the building's concrete floor slab or subsurface soil or groundwater, subsurface conditions would not be expected to represent a potential health or environmental concern if the building continues in its current uses. Any cuts in the floor slab (e.g., for utility work) associated with the renovation should be sealed following the work to prevent potential vapor intrusion. If future plans for Property redevelopment involve subsurface disturbance beneath the Property building, additional subsurface testing is recommended to identify potential contamination in soil or groundwater beneath the building.
- Since evidence of contamination was identified during the 2007 investigation, AKRF recommends that soil disturbance on the Property be conducted in accordance with a Health and Safety Plan to address the contingency that contaminated soil could potentially be encountered. If petroleum-contaminated soil or any other type of contamination is identified, it should be managed in accordance with all applicable requirements, which may include spill reporting to the New York City Department of Environmental Protection (NYSDEC). Erosion and sediment control measures would also need to be implemented during soil disturbance to prevent sediment discharge to the Bronx River. Any excess material (which may include historic fill materials) associated with the construction should be properly disposed of off-site in accordance with all applicable regulations. Based on the elevated concentrations of lead and mercury identified in some soil samples during the 2007 investigation, some soil may require disposal as a regulated waste and potentially as hazardous waste; however, additional testing would be necessary to characterize the material.
- If dewatering is required during construction activities, water should be discharged in accordance with New York City Department of Environmental Protection (NYCDEP) requirements.
- The on-site fuel oil UST would be removed as part of the renovation. If required, the tank should be registered/deregistered with the NYSDEC and appropriately filed with the New York City Fire Department and/or Department of Buildings. The tank should be properly closed and removed, along with any contaminated soil. Any evidence of petroleum contamination should be reported to NYSDEC and/or other regulatory agencies, as applicable.
- The proposed renovation would include filling of the building's basement. Clean fill, not containing construction or demolition debris, should be used for this purpose.
- If mold is observed in insulation under the building's roof during renovation, the affected material should be properly removed and replaced in accordance with the applicable regulations and guidelines.

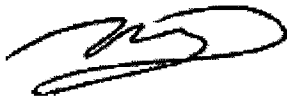
- Unless the damaged pipe insulation in the former garage is known to be non-ACM, this insulation should be sampled and, if determined to be ACM, removed or repaired in accordance with applicable requirements. Prior to initiating the planned renovation activities, an asbestos survey should be conducted to identify all ACM throughout the building. All abatement activities should be conducted in accordance with all applicable regulations. If the planned renovation work is not implemented, an appropriate operation and maintenance (O&M) plan should be developed to properly maintain all ACM throughout the building in accordance with applicable regulations.
- Any renovation or demolition activities with the potential to disturb lead-based paint are subject to a variety of requirements, including US Occupational Safety and Health Administration regulation 29 CFR 1926.62 (Lead Exposure in Construction).

Unless there is labeling or test data that indicate that electrical equipment does not contain PCBs and that fluorescent lighting fixtures do not contain mercury and/or PCBs, disposal, if required, should be performed in accordance with applicable federal, state, and local regulations and guidelines.

10.0 SIGNATURE PAGE

I declare that, to the best of my professional knowledge and belief, I meet the definition of Environmental Professional as defined in §312.10 of 40 CFR 312.

I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the property for which the assessment was performed. I have performed all the appropriate inquiries in conformance with standards and practices set forth in 40 CFR Part 312.



Marc S. Godick, LEP
Senior Vice President

11.0 QUALIFICATIONS

The purpose of this assessment was to convey a professional opinion about the potential presence or absence of contamination, or possible sources of contamination on the property, and to identify existing and/or potential environmental problems associated with the property including *Recognized Environmental Conditions* as defined in ASTM Standard E1527-05, *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Practice*.

The assessment was performed in accordance with customary principles and practices in the environmental consulting industry, and in accordance with the above-referenced ASTM Standard, except as noted otherwise in Section 8.0. It should only be used as a guide in determining the possible presence or absence of hazardous materials on the property at the time of the reconnaissance, as it is based upon the review of readily available records relating to both the property and the surrounding area, as well as a visual reconnaissance of current conditions.

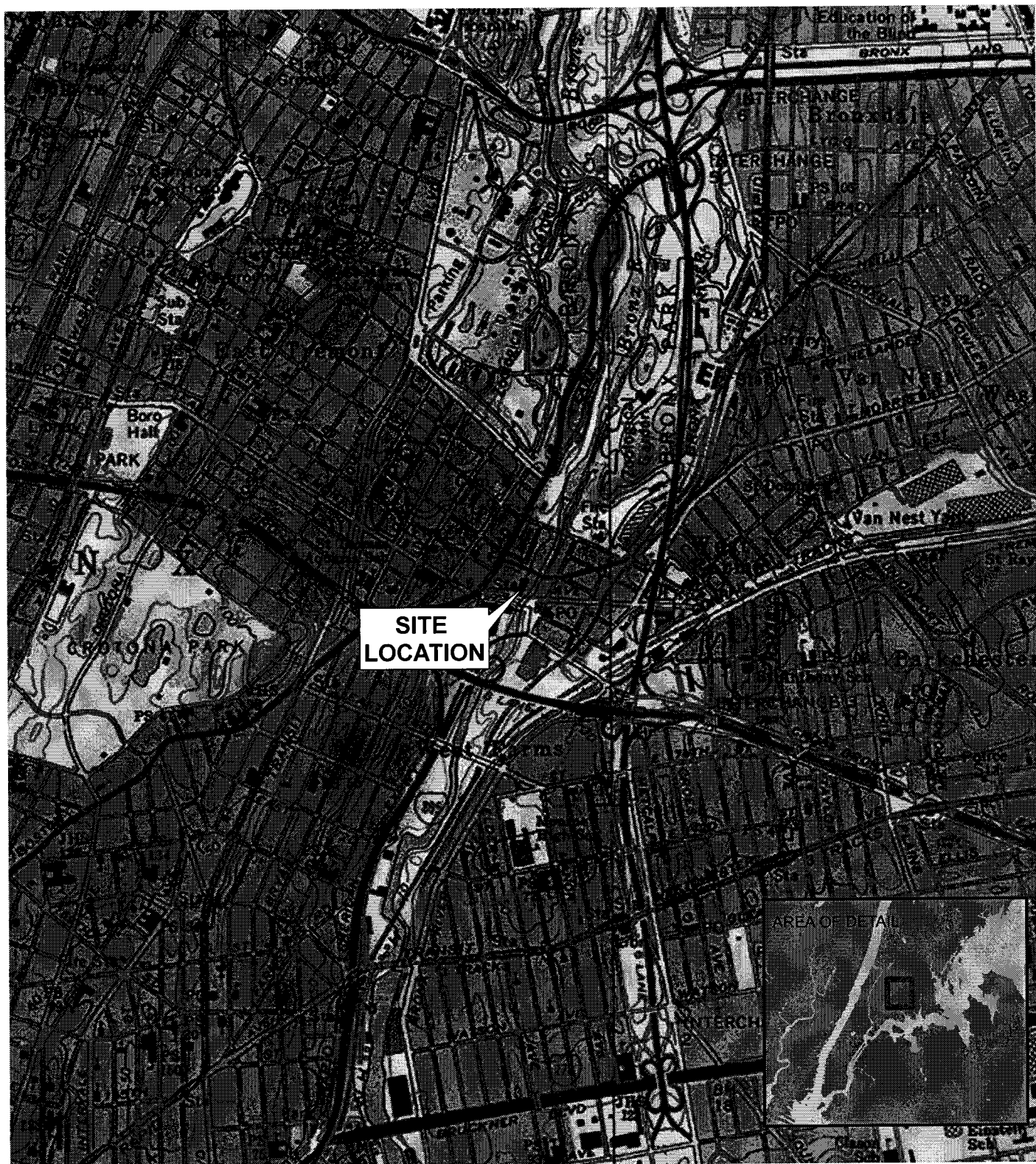
This Phase I Assessment is not, and should not be construed as, a guarantee, warranty, or certification of the presence or absence of hazardous substances, which can be made only with testing, and contains no formal plans or recommendations to rectify or remediate the presence of any hazardous substances which may be subject to regulatory approval. This report is not a regulatory compliance audit.

This report is based on services performed by AKRF, Inc. professional staff and observation of the property and its surroundings. We represent that observations made in this assessment are accurate to the best of our knowledge, and that no findings or observations concerning the potential presence of hazardous substances have been withheld or amended. The research and reconnaissance have been carried to a level that meets accepted industry and professional standards. Nevertheless, AKRF and the undersigned shall have no liability or obligation to any party other than Bronx River Art Center and their successors or assignees, and AKRF's obligations and liabilities to the above, their successors or assignees is limited to fraudulent statements made, or grossly negligent or willful acts or omissions.

12.0 REFERENCES

1. Toxics Targeting, Inc.; 1087 East Tremont Avenue - Bronx, NY; Regulatory Radius Search; June 7, 2010.
2. U.S. Geological Survey; *Central Park, New York – New Jersey Quadrangle*; 7.5 minute Series (Topographic); Scale 1:24,000; 1966; Photorevised 1995.
3. New York State Department of Health: Office of Public Health - Environmental Radiation Section; Basement Radon Screening Data; October 2009.
4. Environmental Resource Mapper – N.Y.S. Department of Environmental Conservation; accessed on June 16, 2010: <http://www.dec.ny.gov/animals/38801.html>.
5. Wetlands Mapper – U.S. Fish and Wildlife Service; accessed on June 16, 2010: <http://www.fws.gov/wetlands/Data/mapper.html>.
6. Flood Insurance Rate Maps – New York City Department of Buildings; Revised Preliminary Bronx Map 0084, October 20, 2006: http://gis.nyc.gov/dob/fm/pdf/panel0084_6000_B.pdf.
7. Sanborn Insurance Maps dated 1901, 1915, 1951, 1977, 1989 and 2006.
8. *Geotechnical Investigation, Contract X288-102M – Reconstruction of Bronx River Park*; Langan Engineering & Environmental Services (Langan), December 2005.
9. *Limited Phase II Environmental Site Investigation (ESI) for the Bronx River Arts Center*; LiRo Engineers, Inc. (LiRo), September 2007.

FIGURES



SOURCE
USGS 7.5 Minute Topographic Map
Central Park Quad 1995

0 1,000 2,000
Feet



BRONX RIVER ART CENTER
BRONX, NEW YORK

PROJECT SITE LOCATION



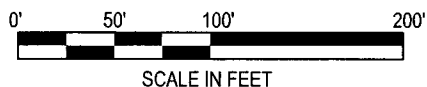
Environmental Consultants
440 Park Avenue South, New York, N.Y. 10016

DATE
06.30.10

PROJECT No.
02965

FIGURE
1

© 2010 AKRF, Inc. Environmental Consultants M:\AKRF Project Files\02965 - Pro Bond\Bronx River Art Center\Figures\Bronx_river_arts_Fig 2 Site Plan.dwg



LEGEND:

———— PROJECT SITE BOUNDARY

BRONX RIVER ARTS CENTER
BRONX, NEW YORK

SITE PLAN DETAIL



Environmental Consultants
440 Park Avenue South, New York, N.Y. 10016

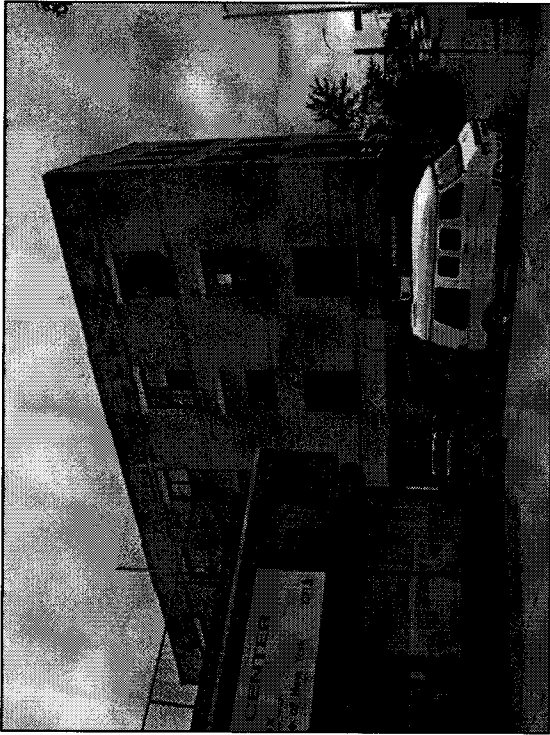
DATE
06.30.10

PROJECT No.
02965

SCALE
as shown

FIGURE
2

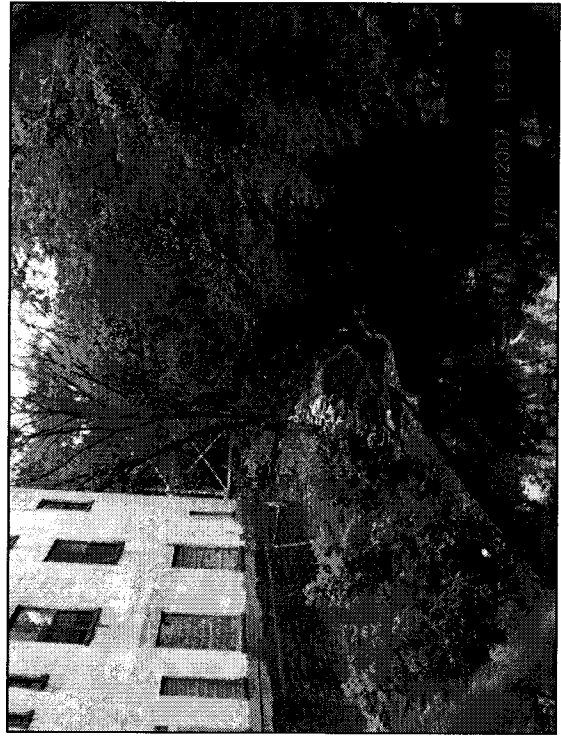
APPENDIX A
PHOTOGRAPHIC DOCUMENTATION



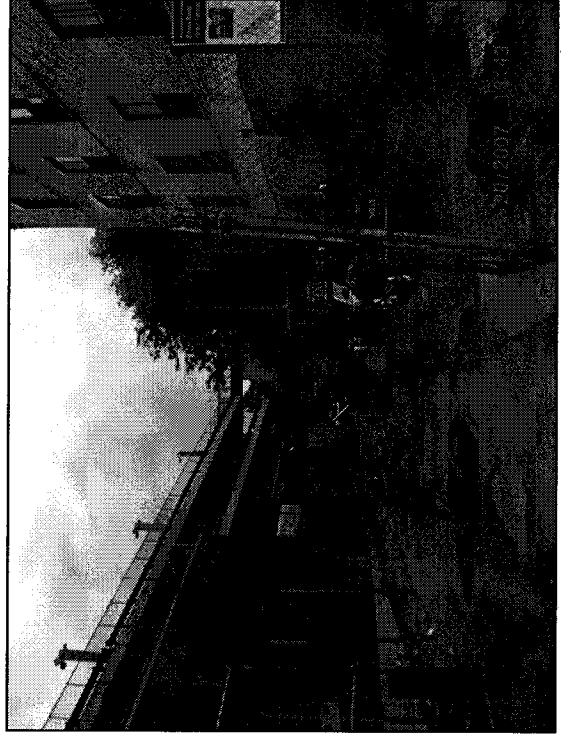
Photograph 1. The Property building, looking east from East Tremont Avenue.



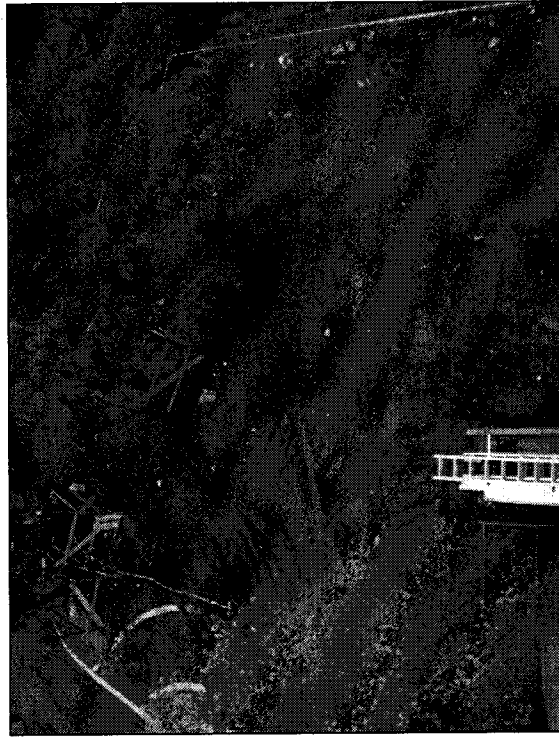
Photograph 2. A vent pipe and fill port for the fuel oil storage tank in the building's basement.



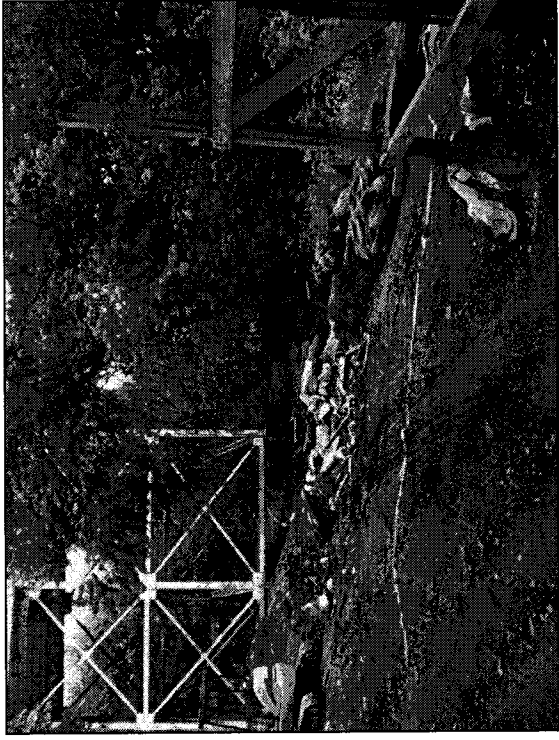
Photograph 3. The Property building and the Bronx River, looking north from the East Tremont Avenue bridge. Note the floating plastic booms (an erosion and sediment control measure) along the western bank.



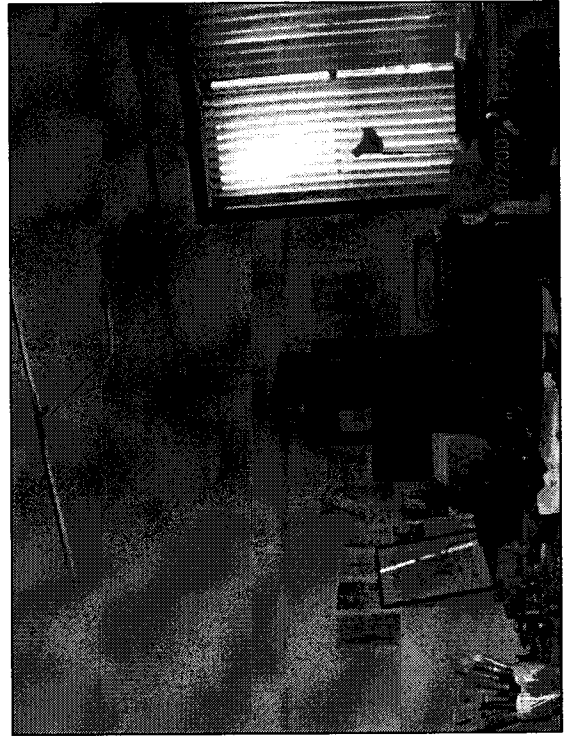
Photograph 4. A construction entrance (former Bronx Street) to the northern portion of the Property (the rear courtyard area) and the off-site Bronx River Park Restoration construction area.



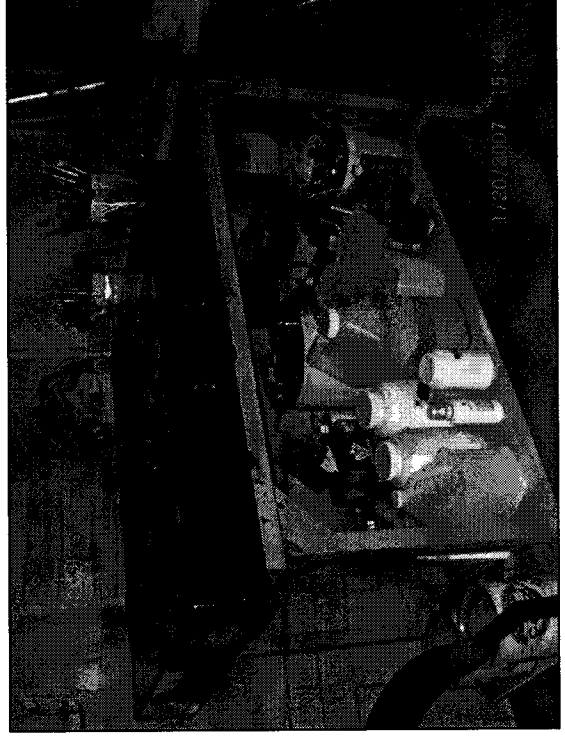
Photograph 5. The Property rear courtyard area, seen from the building's roof.



Photograph 6. Stockpiles of tires, hay bales, boulders and soil north of the Property on the Bronx River Park Restoration construction site.



Photograph 7. A typical studio on the building's third floor.



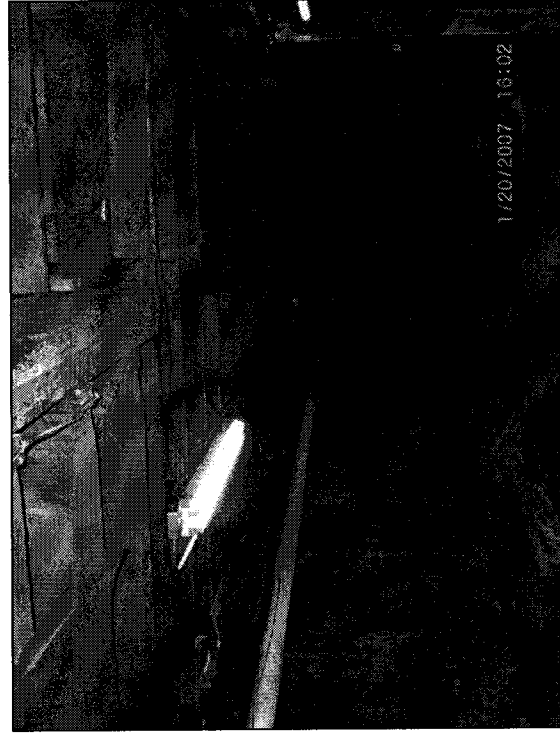
Photograph 8. Paint and art supply storage in the studio.



Photograph 9. Paint stains in a sink on the second floor.



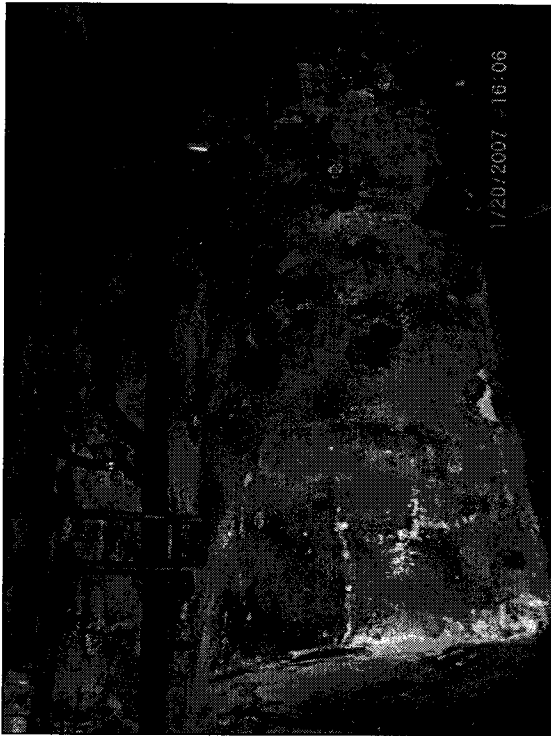
Photograph 10. Gallery space on the ground floor.



Photograph 11. The southern portion of the building's basement.



Photograph 12. An apparent footing in the basement.



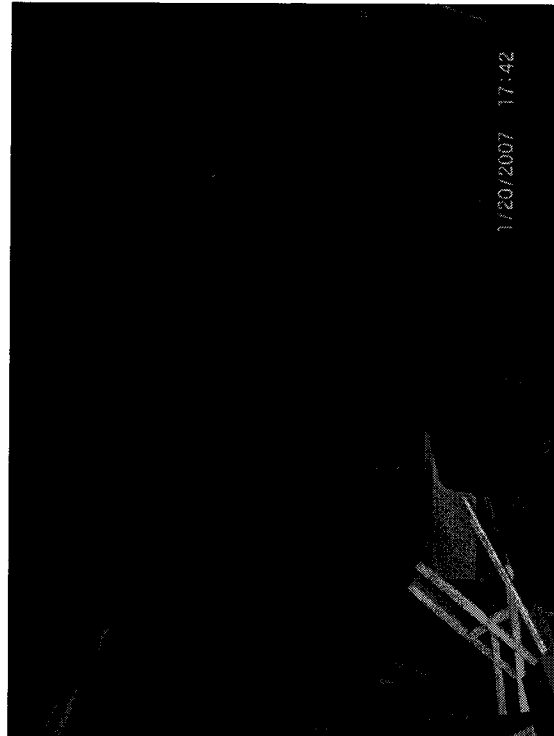
Photograph 13. An approximately 1,500-gallon, concrete-encased fuel oil storage tank in the boiler room in the northern portion of the basement.



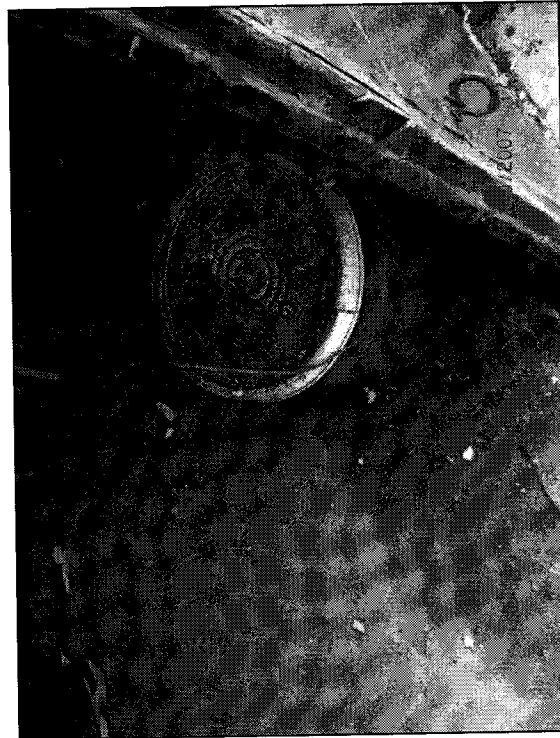
Photograph 14. A water-filled sump in the boiler room.



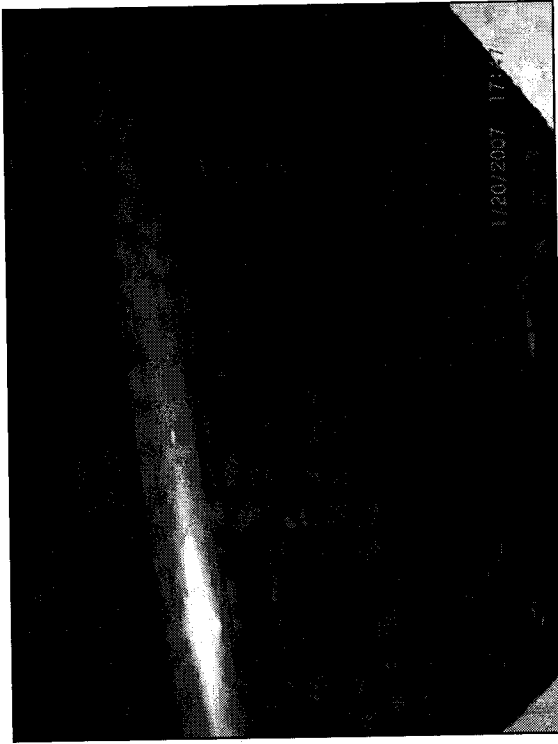
Photograph 15. A bucket containing oil under boiler piping.



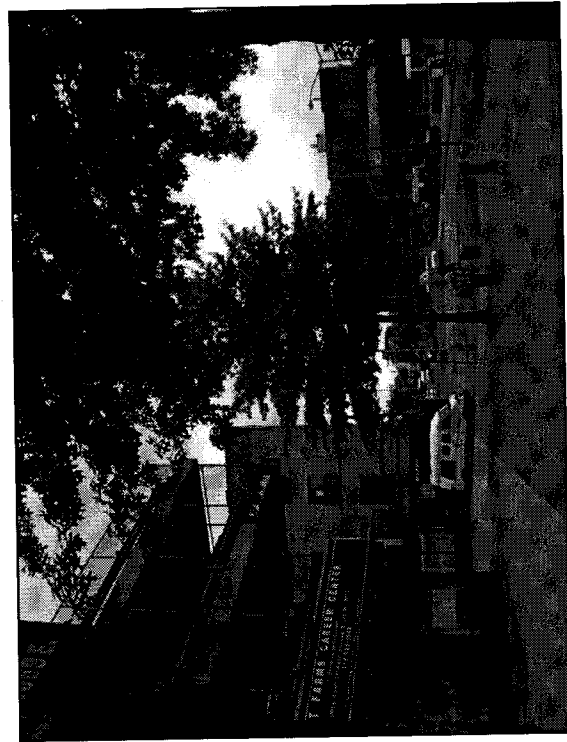
Photograph 16. A vacant former garage in the northern portion of the ground floor.



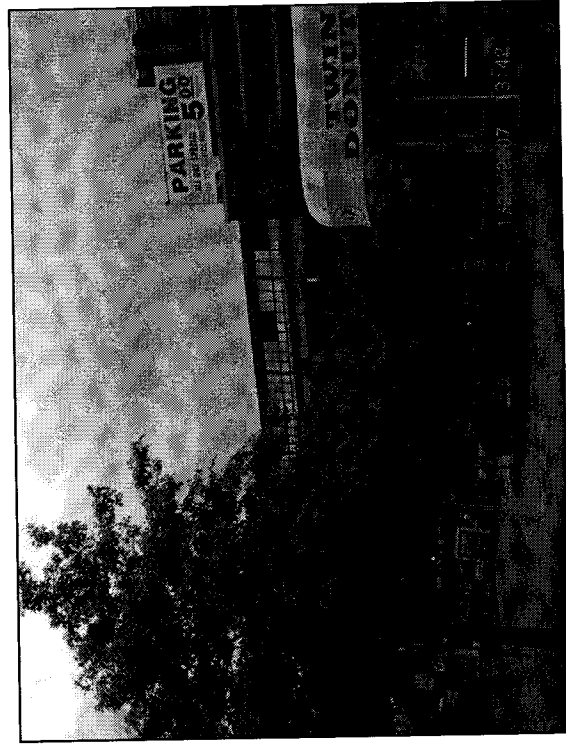
Photograph 17. Historical staining on the garage floor.



Photograph 18. A brick and concrete enclosure in the former garage.



Photograph 19. A multistory parking lot west of the Property and the East Tremont Avenue bridge east of the Property, looking east on East Tremont Avenue.



Photograph 20. Elevated train tracks west of the Property, looking west on East Tremont Avenue.

APPENDIX B
NYSDEC JURISDICTIONAL DETERMINATION

New York State Department of Environmental Conservation
Division of Environmental Permits, Region 2
47-40 21st Street, Long Island City, NY 11101-5407
Phone: (718) 482-4997 • Fax: (718) 482-4975
Website: www.dec.ny.gov



Alexander B. Grannis
Commissioner

July 9, 2010

Marc S. Godick
Sr. Vice President
AKRF
440 Park Avenue South, 7th Floor
New York, New York 10016

Re: NYSDEC No. 2-6005-00888/00009
Bronx River Arts Center
1087 East Tremont Avenue
Bronx, New York

Dear Mr. Godick:

In response to your request, please be advised that the proposed garden in the northern (rear) portion of the above referenced property is not within NYSDEC jurisdiction pursuant to the following regulations;

6NYCRR Part 305 - Coastal Erosion
6NYCRR Part 661 - Tidal Wetlands
6NYCRR Part 663 - Freshwater Wetlands
6NYCRR Part 608 - Protection of Waters

Please be advised that this determination is valid for work as shown on the site plan depicting the boundaries of the proposed garden, received by NYSDEC on June 7, 2010, and that any change in the scope of the proposed activities may require NYSDEC approval.

If you have any questions regarding this matter please contact this office.

Very truly yours,


John F. Cryan
Regional Permit Administrator

cc: NYSDEC Marine Resources



FMS ID: PV467BRAC-R



**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/buildnyc

Contract for Furnishing all Labor and Material Necessary and Required for:

CONTRACT NO. 1 GENERAL CONSTRUCTION WORK

Bronx River Art Center Renovation

LOCATION: 1087 East Tremont Avenue
BOROUGH: Bronx 10460
CITY OF NEW YORK

Contractor

Dated _____, 20____

Entered in the Comptroller's Office

First Assistant Bookkeeper

Dated _____, 20____

